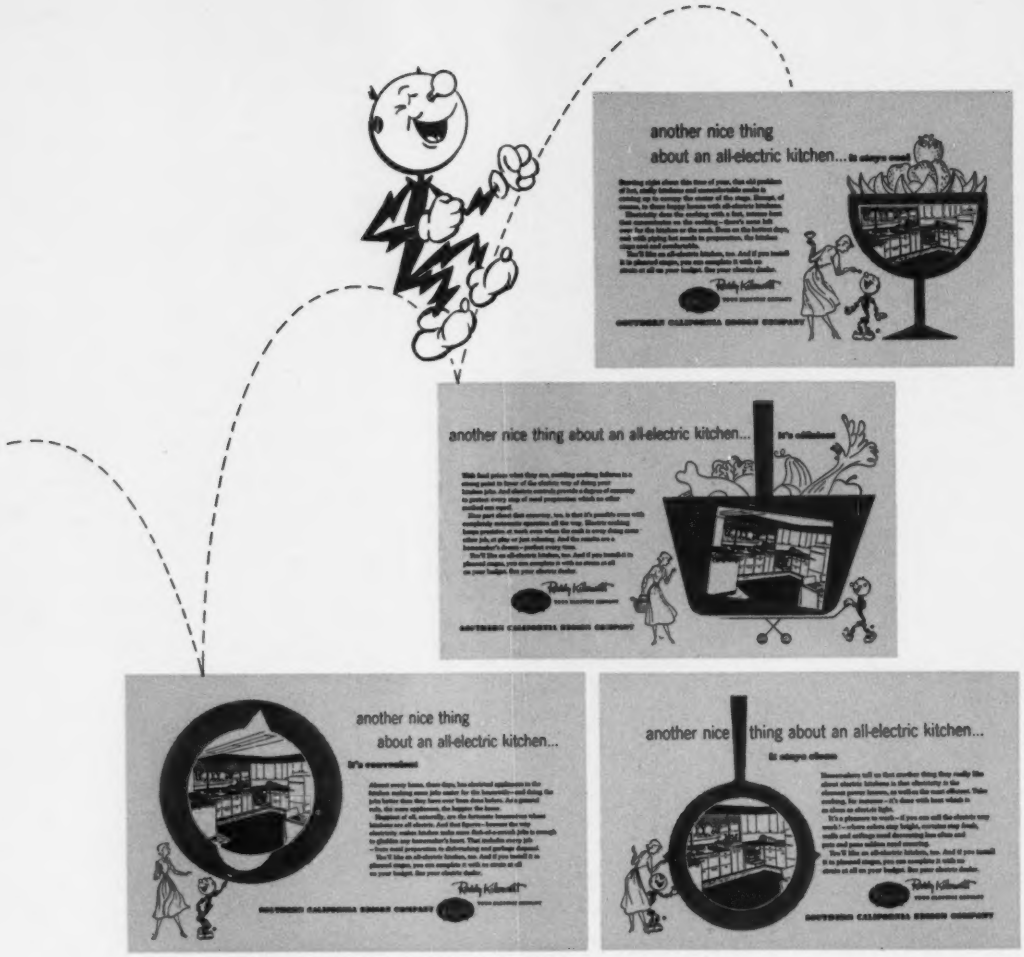
ELECTRICAL WEST

June 1952
25 Cents

20th Annual Convention-in-Print

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

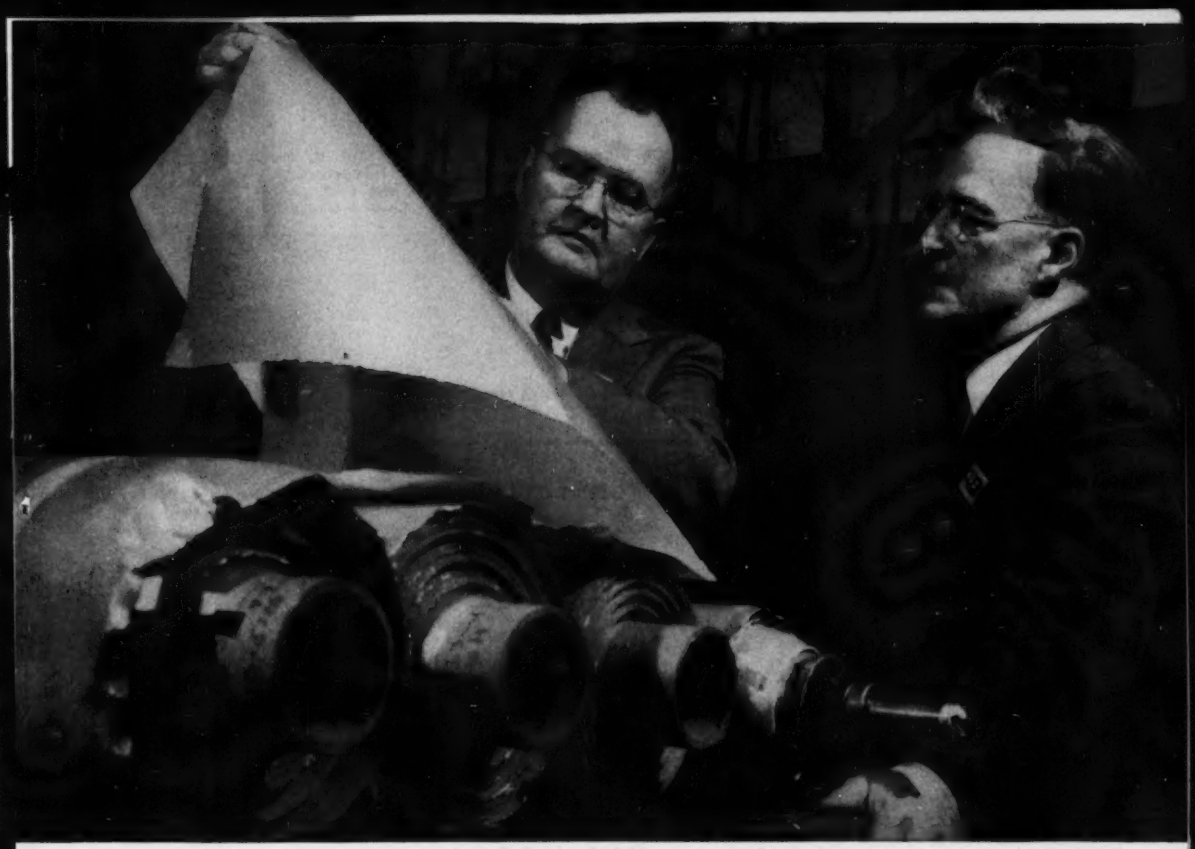

another nice thing
about an all-electric kitchen...
another nice thing about an all-electric kitchen...
another nice thing
about an all-electric kitchen...
another nice thing about an all-electric kitchen...

One thing and another!

Ask four people what they consider the chief benefit of an all-electric kitchen, and you may well get four different answers. So when you stress one advantage in an advertisement, you appeal to a certain number of people, and when you stress four advantages, you appeal to more people.

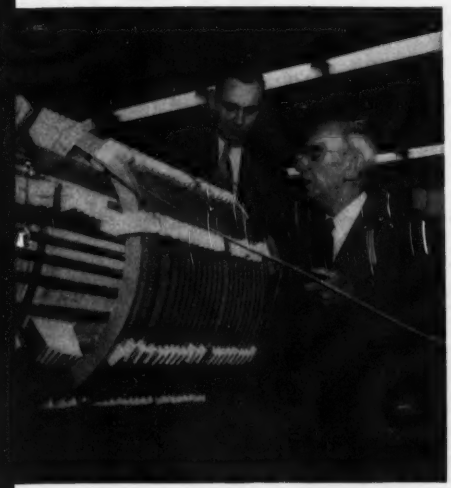
That's what goes on in this series of "another nice thing" advertisements on all-electric kitchens. Appearing in newspapers everywhere in Edison territory, they are helping the appliance dealers of Central and Southern California to make cumulative sales—that is, with one appliance sale leading to another. All-electric kitchens can be sold a step at a time—and the dealer profits at every step.

SOUTHERN CALIFORNIA EDISON COMPANY



Excellent dielectric properties of mica mat sheets are discussed by Dr. H. F. Miller, Manager G-E Transformer Laboratory, Pittsfield, Mass., and Dr. K. B. McEachron, Manager, Laboratory-Engineering Dept. Mica mat process can use domestic mica, ending dependence on foreign supplies.

NOW... PURE MICA BY THE ROLL



Application of mica mat in large dry-type distribution transformer is examined by Dr. E. A. Kern, Supervisor of Insulation, Transformer & Allied Products Lab., where process was developed, and E. D. Treanor, Manager, Dist. Transformer Engineering. Tests show improved protection from corona.

New development in insulation, mica mat promises improved electric equipment

Answering the need for an improved insulating material to expand horizons of electric equipment design, mica mat is an important new research contribution to electrical industry progress.

For the first time, it makes available the advantages of pure mica in an almost limitless variety of forms and applications. Also, for the first time, small flake domestic mica can be used, eventually ending dependence on critical foreign supplies.

Key to this development is a new process in which mica, reduced to small flakes, may be manufactured like paper into continuous sheets. Rolls 24 inches wide and up to 2,500 feet long have been produced. Variations in processing permit molding into different shapes. In combination with other materials and binders, mica mat makes possible a whole series of new insulating products with qualities better than those previously attainable.

Already, it has proved its value in railroad traction motors and studies of possible uses in other rotating equipment are under way. Applications are being made in dry-type distribution transformers. New opportunities are opened up for the production of improved electric equipment. The whole electrical industry will benefit. General Electric Company, Schenectady 5, New York.

301-191

MORE POWER TO AMERICA

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

JUNE 1952

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S. The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-fourth year of publication

VOL. 108 NO. 6

ELECTRICAL WEST

George C. Tenney, Editor
W. A. Cyr, Associate Editor — Walter C. Heston, Engineering Editor
Peggy Boyer, Assistant Editor — John Coetz, Typography

Next Month

One of the outstanding addresses before the PCEA convention in June will be picked for the lead-off article for July. There will be some outstanding speakers to choose from.

An article on the system-wide microwave installation of the Southern California Edison Co. will be of especial interest to utilities with communication growing pains.

In building a new storeroom and service center, the Sacramento Municipal Utility District looked over similar new facilities in the West and came up with something special. The finished result will be described by Hal LaFortune.

Radical new design features in outdoor steam plants have been incorporated in the new Highgrove plant of the California Electric Power Co. July will feature an article on this plant.

Use of aluminum for urban distribution, and the problems of connectors and accessories, is currently a live topic in the industry. We will have a further contribution to the literature on this subject to offer.

Should groundmen be required to wear "hard" hats for safety? One utility requires that they do and will tell why and recite its experience.

The July number will also carry reports of a number of important industry meetings, news of Western industry and people and new product information.

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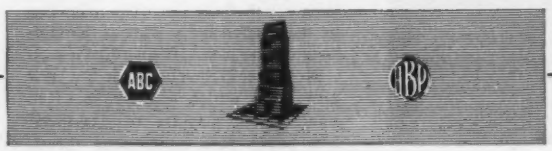

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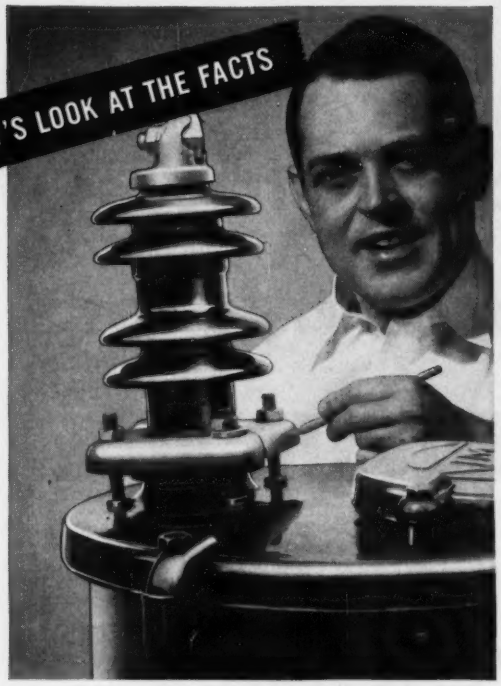


FIGURE 1. Cover bushings on an L-M Round-Wound 15 kva 7200 volt transformer. Note the generous width of skirting for high creepage distance, the four-bolt cover clamp that assures even pressure on gasket and porcelain.

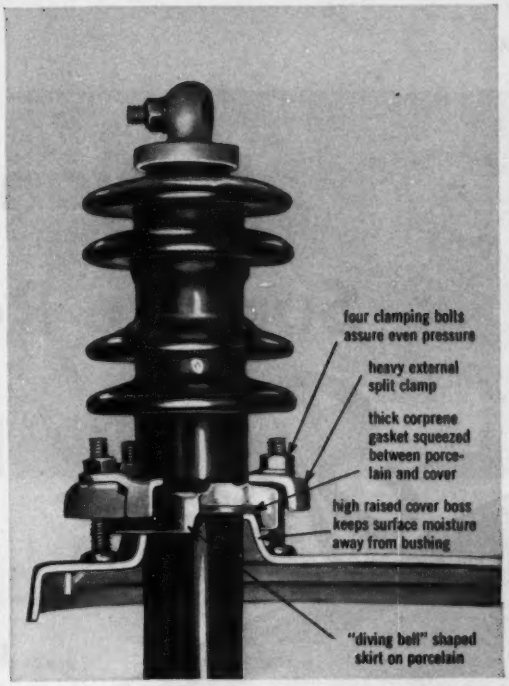

four clamping bolts assure even pressure
heavy external split clamp
thick corprene gasket squeezed between porcelain and cover
high raised cover boss keeps surface moisture away from bushing
"diving bell" shaped skirt on porcelain

FIGURE 2. Close-up of triple-seal against moisture. 1. Deep-skirted porcelain gives "diving bell" effect. 2. Thick corprene gasket, squeezed between porcelain and steel boss. 3. Deep-drawn cover boss keeps moisture away.

Cover Bushings on L-M Round-Wound® Transformers Triple-Protected Against Moisture, Corona

"Diving Bell" design porcelain, thick corprene gasket, and high raised boss on cover provide triple barrier

By ALVIN B. COYLE,
Manager Transformer Sales
Line Material Company

In the design of cover bushings, L-M engineers have gone to great lengths to eliminate moisture entrance and corona, which would cause undesirable radio interference.

The porcelain itself is designed with exceptionally generous creepage distance and high wet-flashover characteristics. The best grades of electrical porcelain are used, with the surface fully glazed. At the bottom is an extra skirt or lip, which is curved downward to give a "diving bell" effect in keeping moisture away from the gasket.

The porcelain is mounted on an exceptionally high raised boss in the cover, which in itself leads moisture away from the bushing. Between the boss and the porcelain is a thick corprene gasket tightly squeezed by the four-bolt cover clamp. Corprene has the initial hermetic sealing property of synthetic rubber plus the elasticity and non-flowing characteristics of cork to maintain a permanent vapor-proof seal.

The result is a bushing that provides exceptional protection against moisture and breathing; it is corona-free and causes no radio interference.

Get Full Information

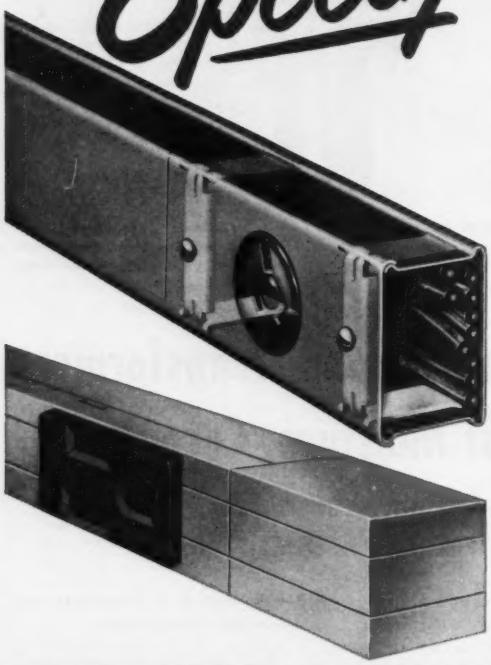
These cover bushings are standard equipment on all L-M Round-Wound transformers of 5000 volts and over. For more information on these and other features of these outstanding distribution transformers, ask the L-M Field Engineer; or write Mr. Coyle at the Transformer Division, Line Material Company, Zanesville, Ohio (a McGraw Electric Company Division).

87

LINE MATERIAL
Transformers
Complete Coordinated Equipment for Distribution Today

LM® ORTO

National Electric Surface Raceways for *Speedy* INDUSTRIAL WIRING,



Use SURFACEDUCT for—

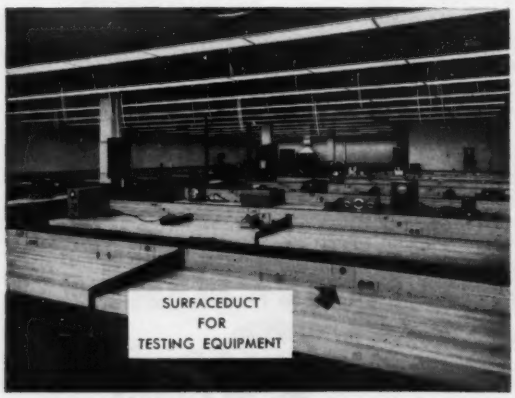
- **Feeder and distribution systems**
- **Lighting installations**
- **Assembly lines, laboratories, work benches**
- **Rewiring existing plants**

Accommodates over 300 manufacturers' devices—22 simple fittings for all job requirements.

Use "PLUG-IN" STRIP (Type CF2-G with Grounding Facility) for—

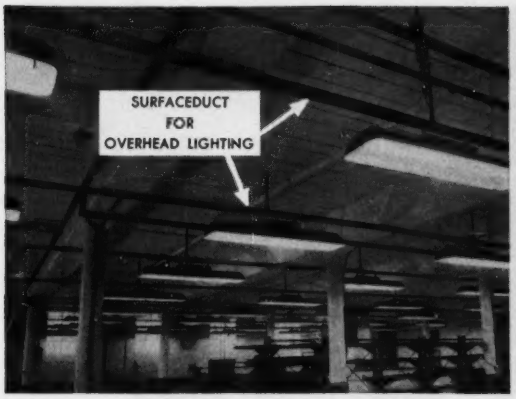
- **Portable equipment**
- **Hand tools**
- **Assembly benches, electrical testing departments, etc.**
- **General office equipment**

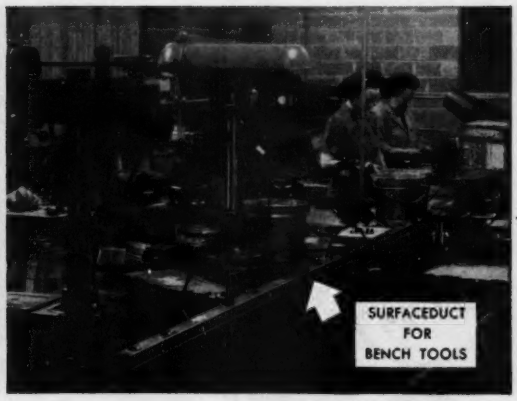
A s-p-r-e-a-d of outlets every 6" or 18" for convenience *plus* safe grounding built-in. Permits use of either grounded or ungrounded devices from same outlet.



SURFACEDUCT FOR TESTING EQUIPMENT

SURFACEDUCT SERVING POWER TO AUTOMATIC SCREW MACHINES





EXTENSIONS and RELOCATIONS

National Electric raceways *go up fast*—just the thing for quick, easy industrial rewiring jobs, electrical additions and relocations.

All NE Surface Raceways are two-piece base and capping with the famous "Lay-in" principle designed to save time—*and money.* No fishing required. Attach the base, lay-in the wires, snap on the capping and the job is done! ("Plug-In" Strip comes pre-wired from the factory, ready to use.)

There's an NE Surface Raceway for every type and size of electrical distribution up to 60 amperes. A minimum of fittings, yet meets requirements for all types of installations.

WRITE for our catalogs on "Surface Raceways" and "Plug-In Strip" for complete details.

NATIONAL ELECTRIC PRODUCTS CORPORATION
1308 Chamber of Commerce Building
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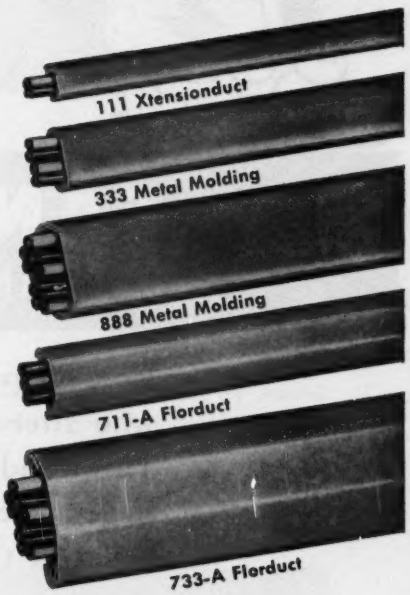
LISTED BY UNDERWRITERS' LABORATORIES, INC.
SOLD THROUGH LEADING ELECTRICAL WHOLESALERS

OTHER NE SURFACE RACEWAYS



EVERYTHING IN WIRING POINTS TO

National Electric Products

PLANTS IN AMBRIDGE, PA. • TORRANCE, CALIF.
ELIZABETH, N. J.

SAN DIEGO – WHERE OUTSTANDING EVENTS ARE STAGED

Here's a picture of some of the 125,000 persons who attended our Spring Fair – April 15, 1952. This wonderful show plus the Fall Electric Shows, staged every year since 1933, are proof of our belief in the mass merchandising of appliances.

ANOTHER OUTSTANDING EVENT

...the annual PCEA Convention to be held at Hotel del Coronado, June 11, 12 and 13. We'll be seeing you!

SAN DIEGO GAS & ELECTRIC COMPANY

Forecasts of unprecedented load growth in the coming years suggest many changes in metering practices. That's why a *complete* line of metering equipment holds an advantage for you. Specifically . . .

It's assurance that your future as well as your present needs can be readily fulfilled.

The meters illustrated here are just a few of the broad line of Westinghouse Meters offered to you. These and many more types are available to give you low-cost metering for every circuit application . . . three wire, four wire, wye or delta, or totalizing.

To meet your expanding needs, Westinghouse has continually pioneered new devices to make the desirable changes in metering methods a practical reality. And you have assurance of dependability because every Westinghouse Meter contains the quality and refinements that result from the engineering of a complete line. So whether your needs involve metering large loads or small, single or polyphase circuits, kw or kva, Westinghouse can meet your requirements.

For more information write for Booklet B-4665. Call your Westinghouse Office or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-40412-A

You can be SURE . . . if it's Westinghouse

METERS

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

PARKWAY CABLE

Save the cost of duct systems!...with the most dependable Parkway Cable you can buy!

ROEBLING'S research staff is continually working at the job of product development. Our manufacturing facilities and techniques are constantly improved. That's why our Parkway Cable for distribution and general power supply circuits is today even more dependable than ever before.

Roebling Parkway Cable saves money right from the start because it is buried directly in a shallow, low-cost trench. It is made in single and multiple conductor – solid or stranded – in a range from 600 to 5,000 volts... furnished with metallic armor or a non-metallic *Roeprene* sheath, depending on the physical protection required. Types that pass all C.A.A. requirements for Specification No. L-824 for airport lighting are also available.

Large quantities of Roebling electrical wires and cables are needed in the rearmament program. We will do everything possible, however, to meet your requirements. John A. Roebling's Sons Company, San Francisco–Los Angeles–Seattle.

ROEBLING

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VICTOR DISTRIBUTION INSULATORS

NOW EVEN BETTER WITH PURIFIED PORCELAIN!

Spools, guy strains, pintypes, suspensions—all are made of the same new *PURIFIED* PORCELAIN as VICTOR's high voltage transmission types. This means that every VICTOR insulator is a better insulator —with highest insulation values, unequalled density, rock-like strength, hardness and resistance to impact, and a product uniformity never before achieved!

Through years of research, VICTOR has eliminated the last big variable in porcelain-making by removing all mineral salts from water used in processing. Results are reduced fluctuations in shrinkage and density and virtual elimination of microscopic, glass-like impurities which, up to now, have prevented maximum insulator strength and hardness. Remember—VICTOR *PURIFIED* PORCELAIN is the finest insulator porcelain ever made!

NO. 504
GUY STRAIN

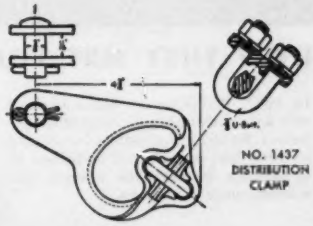
NO. 5 LOW-VOLTAGE
PINTYPE

NO. 2012 SPOOL

NO. 804 SUSPENSION

VICTOR INSULATORS, INC.
VICTOR, N. Y.

VICTOR INSULATORS

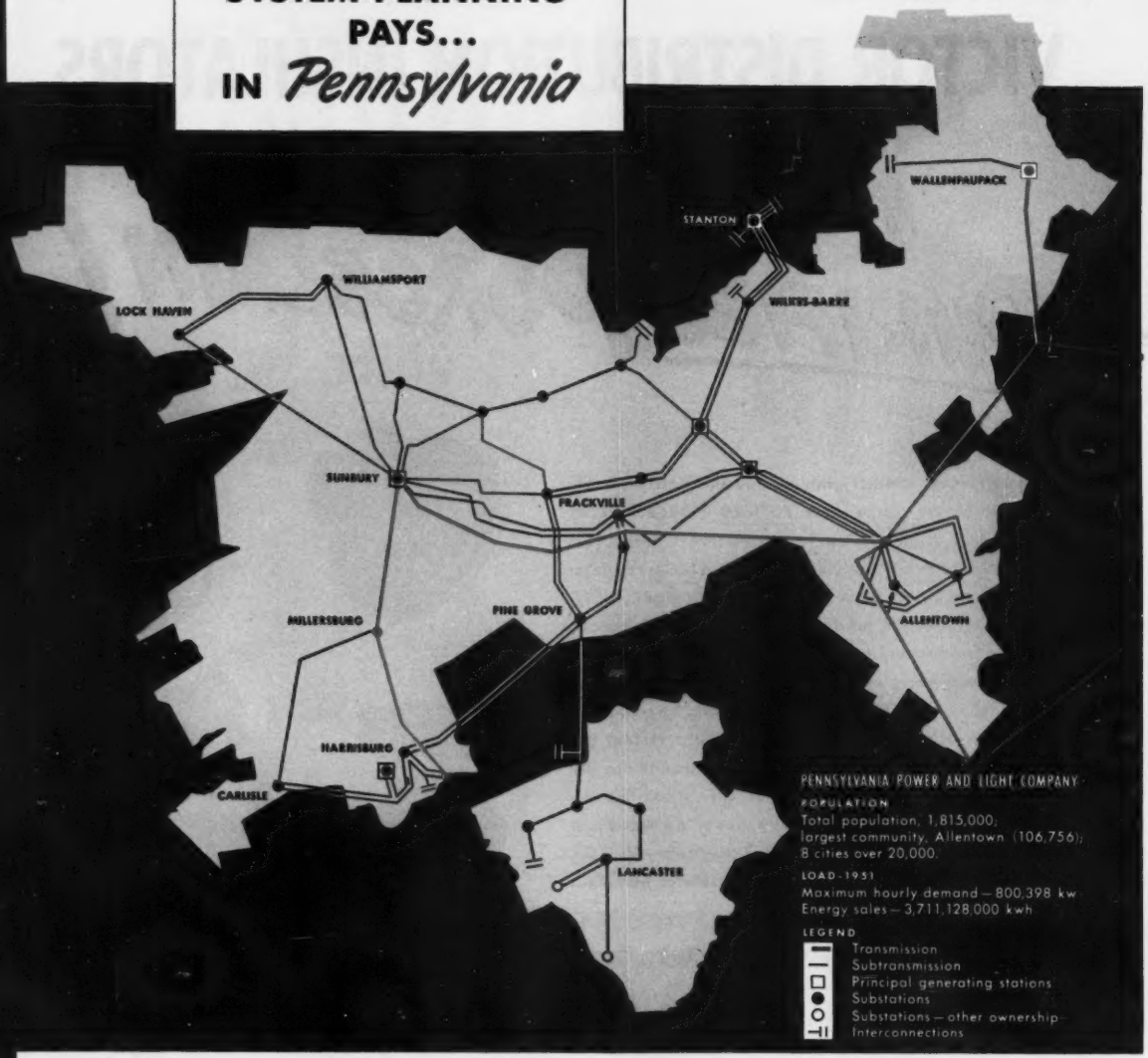


NO. 1437
DISTRIBUTION
CLAMP

DISTRIBUTION LINE HARDWARE

VICTOR carries a complete line of distribution clamps in all required types and materials to accommodate cable sizes from 0.145 to 0.60 inches. Snubbing, quadrant or boltless types in forged steel, malleable iron or pressed steel with or without aluminum liners, according to type and size of cable to be accommodated.

SYSTEM PLANNING PAYS... IN *Pennsylvania*



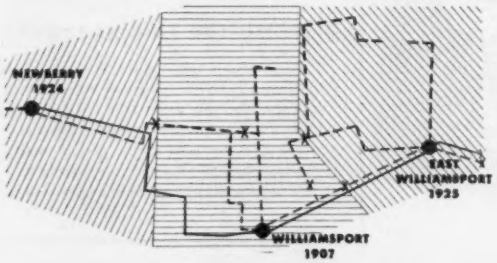
HOW THEY MET LOAD GROWTH AT WILLIAMSPORT...

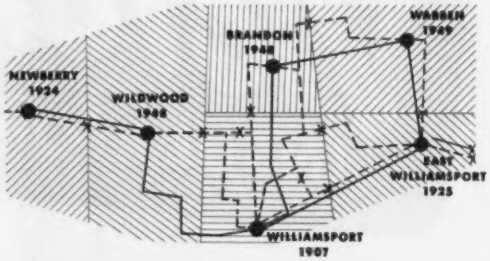
In 1907, Williamsport had a load of 400 kw, with only one substation required. By 1925, the load had increased to 5000 kw, resulting in additions of substations in both the eastern and western parts of the area.

LEGEND

- 12-kv lines
- 4-kv lines
- Area of load responsibility
- Substation and year established
- Normal sectionalizing

Since 1925, the load has increased to 14,000 kw in 1951, and three more substations added. The lines feeding into Williamsport provide the reliability and capacity to expand the distribution system as the load grows.





Small power blocks ...long-range solution

Pennsylvania Power and Light Company can judge accurately the results of their system planning. Today this careful, long-range planning is reflected in their ability to supply more load . . . to grow easily and economically . . . to provide new high levels of service continuity. Small units of "load responsibility" are the cornerstone of this system, permitting them to take full advantage of modern *unitized* substations. The success of their long-range simplified system planning is measured by the practical yardstick of "economic workability".

How they built their system . . . Definite "load responsibility" such as 1500-2000 kva for 4 kv, and 3000-10,000 kva for 12 kv, is assigned to each block. As the load grows, additional blocks of load responsibility are supplied from a carefully planned 66-kv subtransmission system, covering their 9500 square miles of area served. This simplified network, in conjunction with an overlying high-voltage transmission system, permits picking up blocks of load or introducing power supply where required, and enables Pennsylvania Power and Light Company to utilize the inherent flexibility and reliability of modern unitized substations.

Meeting the growth is the payoff . . . While easily and economically meeting load-growth problems like that at Williamsport, the Pennsylvania Power and Light Company have carried on a tremendous expansion program, adding capacity throughout the system. With changes in electrical demands, it won't be necessary to change their "plan" . . . they'll simply accelerate it or slow it down, as the situation requires. Because of the economy and effectiveness of such planning, this progressive utility has every reason to face new peak loads confidently . . . they're ready to grow and grow!

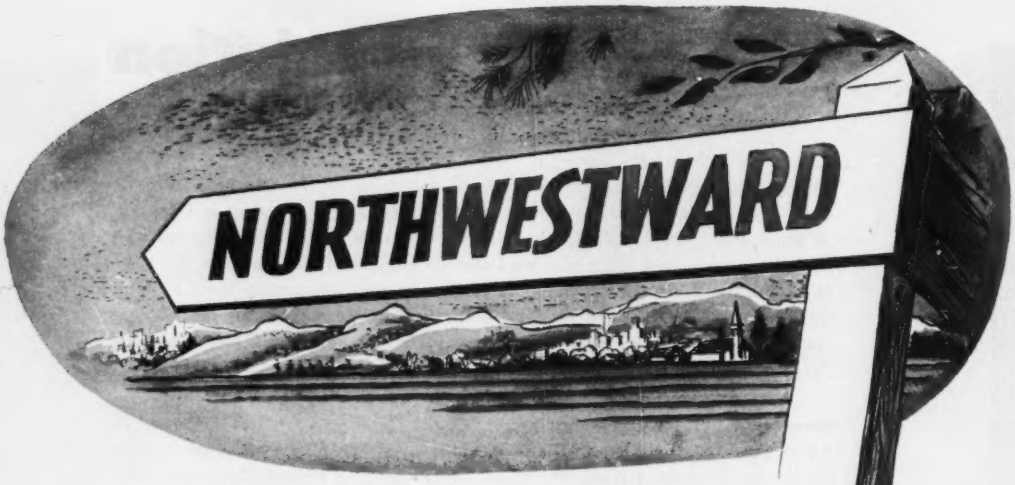
Westinghouse modern unitized equipment, when installed as an integral part of such a long-range plan, can contribute to the ease, dependability, and economy of your operation. A completely staffed System Planning Service is ready to assist you. Call your nearby Westinghouse Office or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

J-97160

YOU CAN BE SURE ... IF IT'S Westinghouse

SYSTEM PLANNING SERVICE

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver



. . . the Course of Empire Takes Its Way!" . . . Rapid, efficient development of the area's vast natural resources of electric power, fertile agricultural acres, mineral wealth, and timber has meant rapid increase in population, markets, and prosperity.

One of the vital factors in this progress toward a future unlimited in the Northwest is effective generation and distribution of dependable low cost electricity, and the promotion of its use for better living for all.

The Northwest Electric Light and Power Association is the medium through which leaders of the electrical industry—utilities, service companies, manufacturers, contractors, wholesalers, and dealers—have coordinated their efforts to make the area a world leader in generation and use of electricity.

In rendering service to the public the American private enterprise way, the Association and its members have stressed *service* and *enterprise*—for the greater good of both the public and the industry.

Business managed electric companies in this region invested $132,000,000 last year and will spend $120,000,000 this year in their postwar development programs. Among other service facilities, these investments brought in 200,000 kilowatts of new capacity in 1951 and will add 534,000 kilowatts in 1952.

NORTHWEST ELECTRIC LIGHT AND POWER ASSOCIATION

OFFICES 204 CORBETT BUILDING • PORTLAND, OREGON

Built to Resist Corrosion & Flooding

NETWORK TRANSFORMERS

TO MEET A GROWING LOAD DEMAND, this 500-kva Allis-Chalmers network transformer is going into service in the heart of a Nashville business district.

Ruggedly built to operate under tough operating conditions, it's designed to withstand temperature extremes, overloads and unusually severe conditions such as flooding or corrosive atmospheres. Where space is critical, its compact design simplifies installation problems and makes periodic inspection easier and quicker.

Today the A-C label is a familiar sight on major electrical systems. One of the best testimonials to dependable, all-around performance of Allis-Chalmers network transformers is the growing approval of utilities and consulting firms throughout the country. Over 1¼ million kva of Allis-Chalmers network transformers are serving on the nation's important electrical systems . . . reflecting a growing acceptance based on a high standard of performance.

Fine workmanship is found in every A-C transformer you buy. Low-loss design is compact. Thermal capacity is high, even for the most severe load conditions. Gauges are conveniently located for best use and visibility. Tanks are sturdily constructed. Welding is external to eliminate crevices.

As protection against corrosion and possible flooding, tank surfaces are shot blasted and then painted with three coats of baked-on phenolic base paint that gives strong resistance to water. Undercoating compound gives additional protection to surfaces most subject to corrosion. Welded-on main cover and switch compartment eliminate gasket maintenance.

Allis-Chalmers builds all three types of network transformers — oil filled, *Chlorextol* liquid filled and sealed dry type. Thus you get an unbiased recommendation on the right network transformer for the right application. And by selecting from standard designs and ratings, you save money and eliminate special engineering.

Why not benefit from Allis-Chalmers wide transformer-building experience. Call in an A-C representative *early* in your network planning stages. Offices in 64 principal cities. Allis-Chalmers, Milwaukee 1, Wisconsin. A-3652

Chlorextol is an Allis-Chalmers trademark.

ALLIS-CHALMERS

Network Transformers—Over 1,000,000 KVA Installed

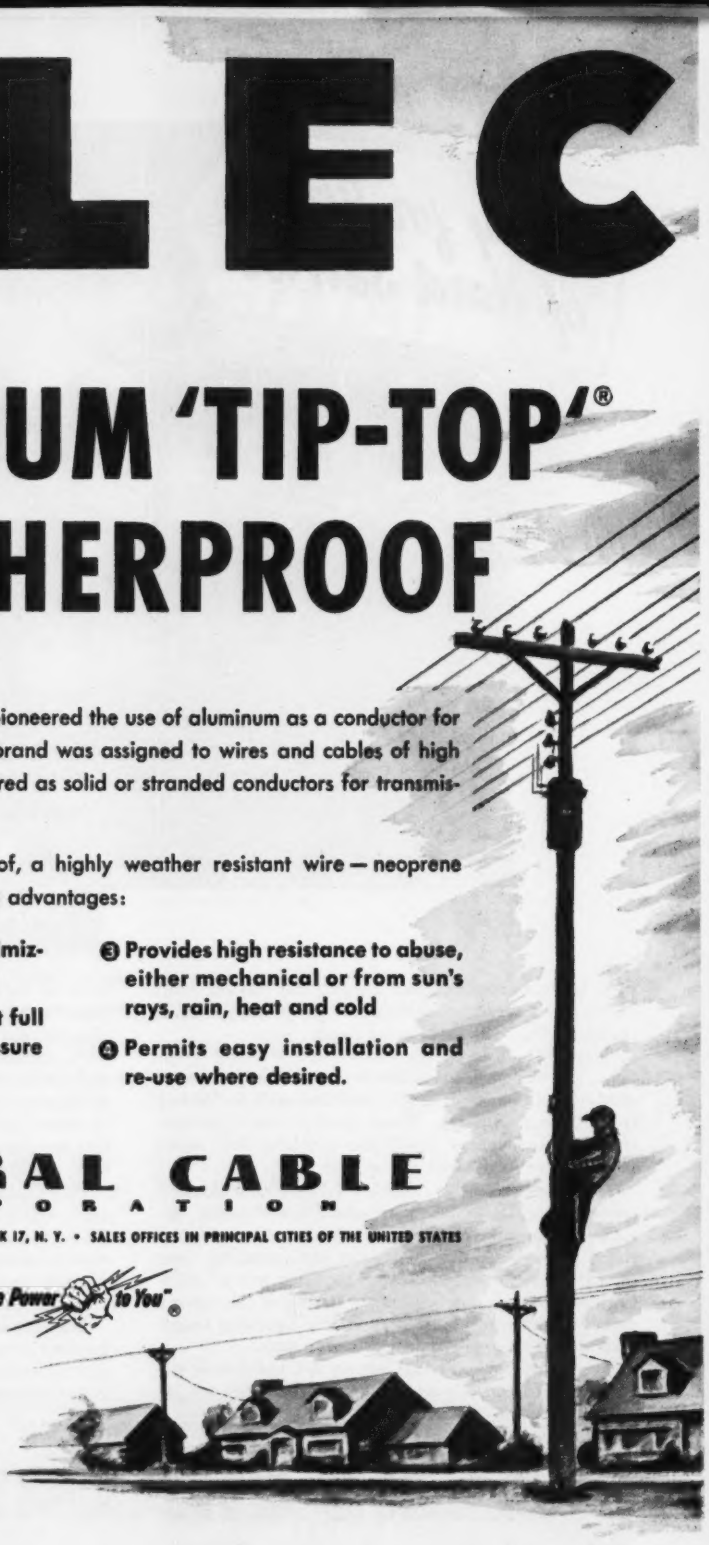
ALEC

ALUMINUM 'TIP-TOP'® WEATHERPROOF

Twenty years ago, ALECTRAL pioneered the use of aluminum as a conductor for all purposes. This General Cable brand was assigned to wires and cables of high tensile strength aluminum, engineered as solid or stranded conductors for transmission and distribution service.

ALECTRAL "TIP-TOP" Weatherproof, a highly weather resistant wire — neoprene jacketed — provides these enduring advantages:

1. **Strips easily and cleanly, minimizing the possibility of nicking**
2. **Clean conductor wires permit full benefit of inhibitors and assure positive connections**
3. **Provides high resistance to abuse, either mechanical or from sun's rays, rain, heat and cold**
4. **Permits easy installation and re-use where desired.**



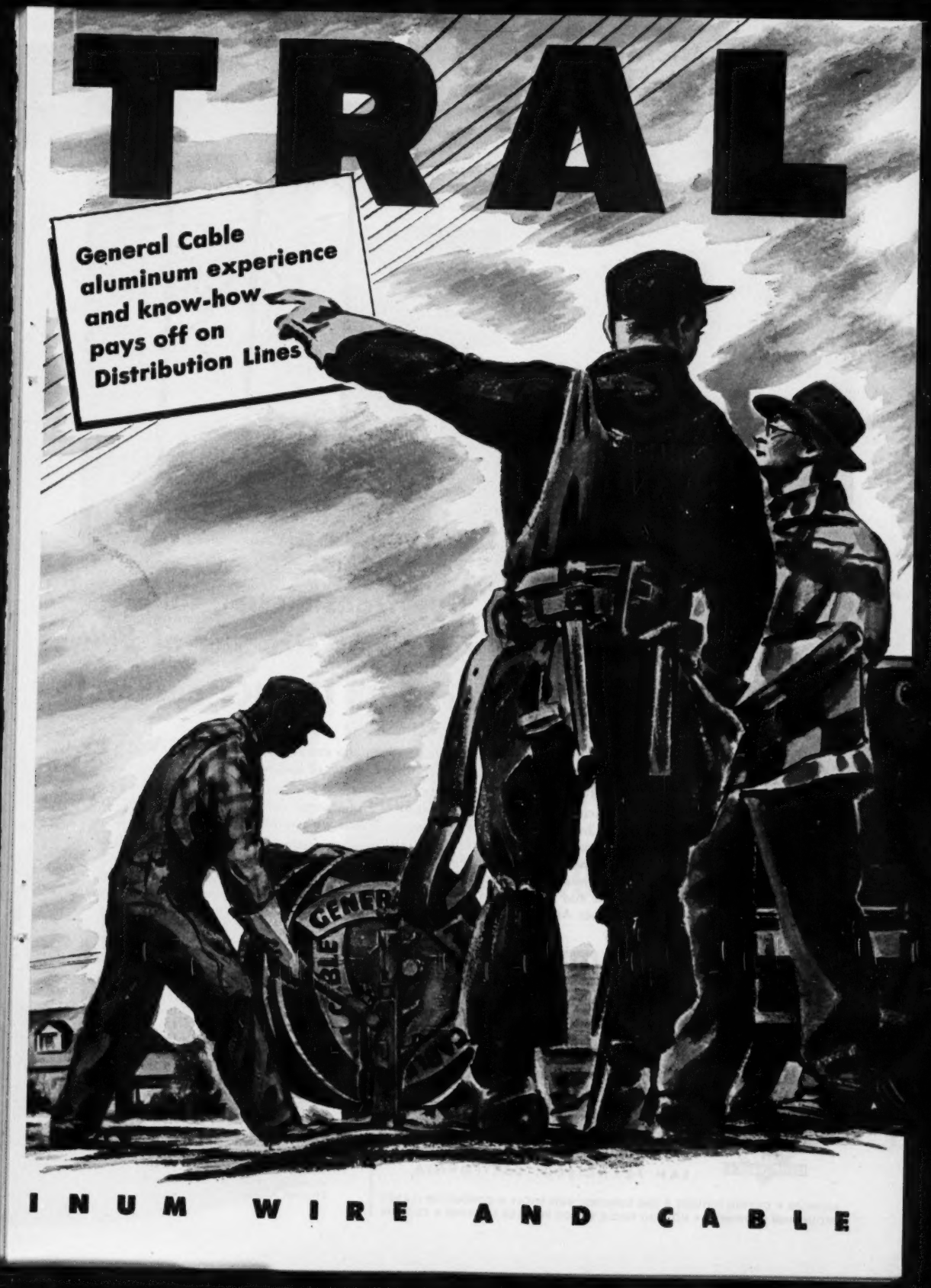
GENERAL CABLE
CORPORATION

EXECUTIVE OFFICES: 420 LEXINGTON AVE., NEW YORK 17, N. Y. • SALES OFFICES IN PRINCIPAL CITIES OF THE UNITED STATES

"More Power to You"®

GENERAL CABLE GENERAL CABLE GENERAL CABLE

PIONEERS IN ALUM


TRAL
General Cable
aluminum experience
and know-how
pays off on
Distribution Lines
INUM WIRE AND CABLE

Guy transmission lines *three times stronger at half the cost* with CHANCE anchors!

You can cut line construction costs and do a *faster,* more efficient job of anchoring by using CHANCE Anchors for transmission line guying.

Here are FACTS . . . cost comparison figures on an actual installation prove that Chance Cross Plate Anchors were installed in only 2 man hours, while it took 8⅓ man hours to install a log anchor in the same terrain! The cost of materials used was approximately the same for each type of anchor and rod—but only one hole was drilled for the Chance Anchor, while a trench was necessary for the log.

Chance Anchors can withstand much greater strain for longer periods of time than treated log anchors. Laboratory tests on a Chance X-24 Cross Plate Anchor proved it capable of withstanding a pull of 70,000 lbs. for an indefinite period of time with only slight bending, while a creosoted log split under a 20,000 lb. pull in a matter of hours.

The Chance Cross-Plate can be installed in slanted or vertical machine bored holes in any kind of soil. It compares in cost with an average 4 foot treated log.

Other Chance Anchors suitable for transmission line guying are: The Never-Creep — that pulls entirely against undisturbed earth . . . The Steel Cone Anchor —ideal for rocky soil . . . and the Chance 8-way Expanding Anchor — that gives you two four-way anchors in one.

You know it's RIGHT when you specify CHANCE

A·B·CHANCE CO·

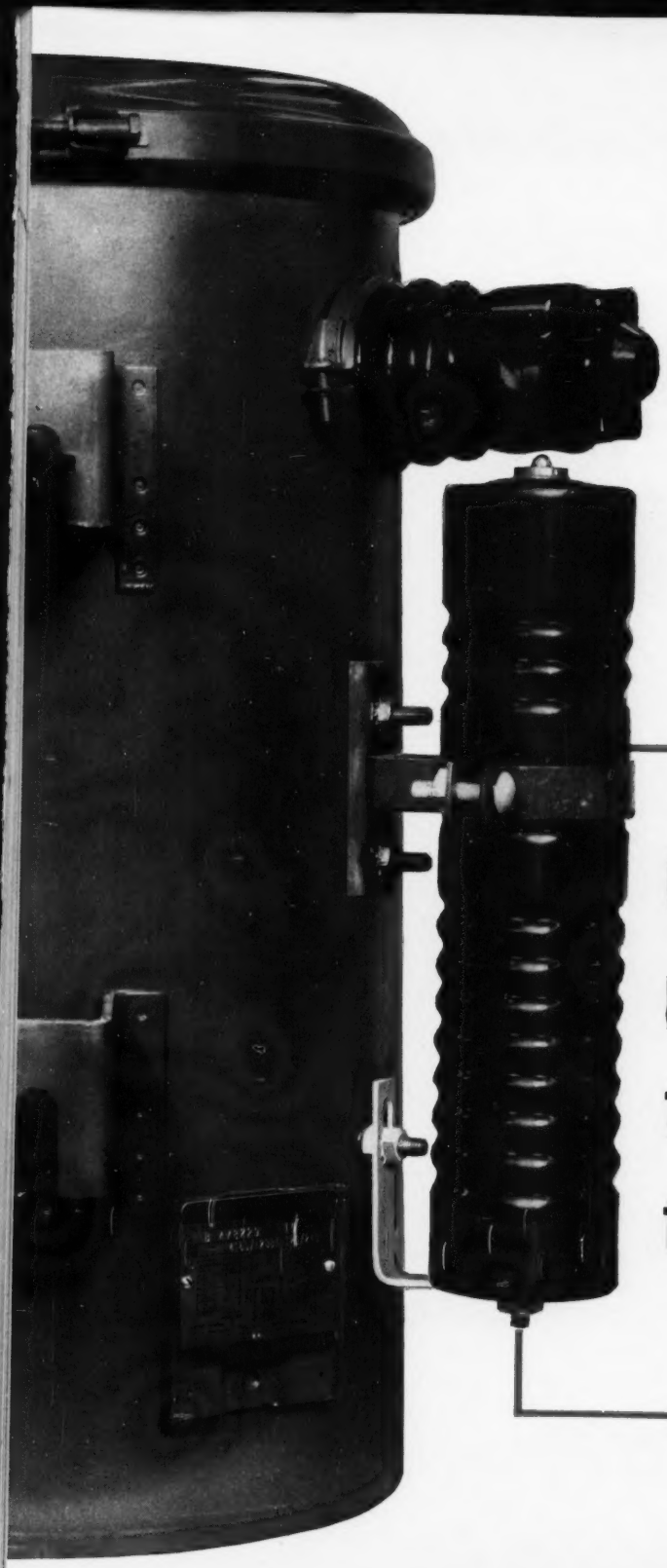
CENTRALIA, MISSOURI
SAN FRANCISCO, CALIFORNIA

ANCHORS • GUYING FIXTURES • LINE CONSTRUCTION TOOLS • CONDUCTOR CLAMPS
GROUNDING EQUIPMENT • HOT LINE TOOLS • HIGH VOLTAGE SWITCHES • CUTOUTS

FIND OUT WHY!

It's wise to use Chance Anchors instead of "dead-man" logs or slugs. Write today for test records and actual cost comparisons. We'll send you reasons why your next transmission line should be guyed the stronger, low-cost way — with CHANCE Anchors.

C52-13



GENERAL ELECTRIC announces two improved transformers

SEE NEXT PAGE

Improved conventional HS transformer

NEW TANK-WALL BUSHINGS. High-voltage bushings of heavy porcelain mount directly on tank wall. Electrical characteristics are improved; cable can be brought in from either side for easier connections.

NEW INSULATED CLAMP-TYPE CONNECTORS eliminate exposed live parts—permit safer, faster connections *without* tools. Cap cannot drop off when unscrewed.

NEW STAINLESS-STEEL CLAMPS hold Nitrile bushing gaskets firmly in place to make an oil-tight seal that helps prevent transformer "breathing" and prolongs oil life.

These "extra-service" features retained.

ONE-PIECE COVER BAND produces uniform gasket pressure around the entire rim—facilitates inspection, maintenance.

NITRILE GASKETS at every opening—cover as well as bushings—assure air-tight sealing. Nitrile gaskets need no adhesives—can be re-used.

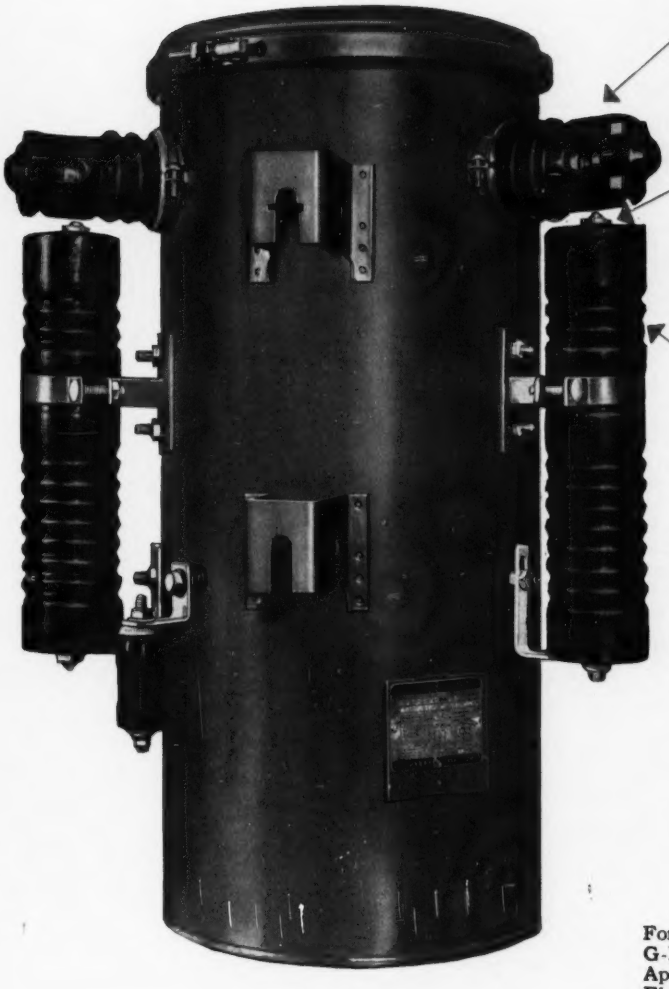
MELAGLYP PAINT FINISH. Two baked-on coats provide superior resistance to weathering, water absorption and abrasion.

SPIRAKORE* DESIGN with its lower losses—greater short-circuit strength—superior regulation—savings in weight.

* Reg. trademark of the General Electric Company.

GE SPIRAKORE* transformers give extra years of service

Improved unit-type HSBA transformer



NEW TANK-WALL BUSHINGS are combined with externally-gapped arresters, an internal high-voltage fuse, and low-voltage circuit breaker to give maximum protection and ease of installation.

NEW EXTERNAL GAPS isolate the new G-E Pellet arresters from the high-voltage leads. Elimination of the positive electrical connection keeps the arrester at ground potential. The internal gap is retained to protect the arrester in case the external gap is shorted.

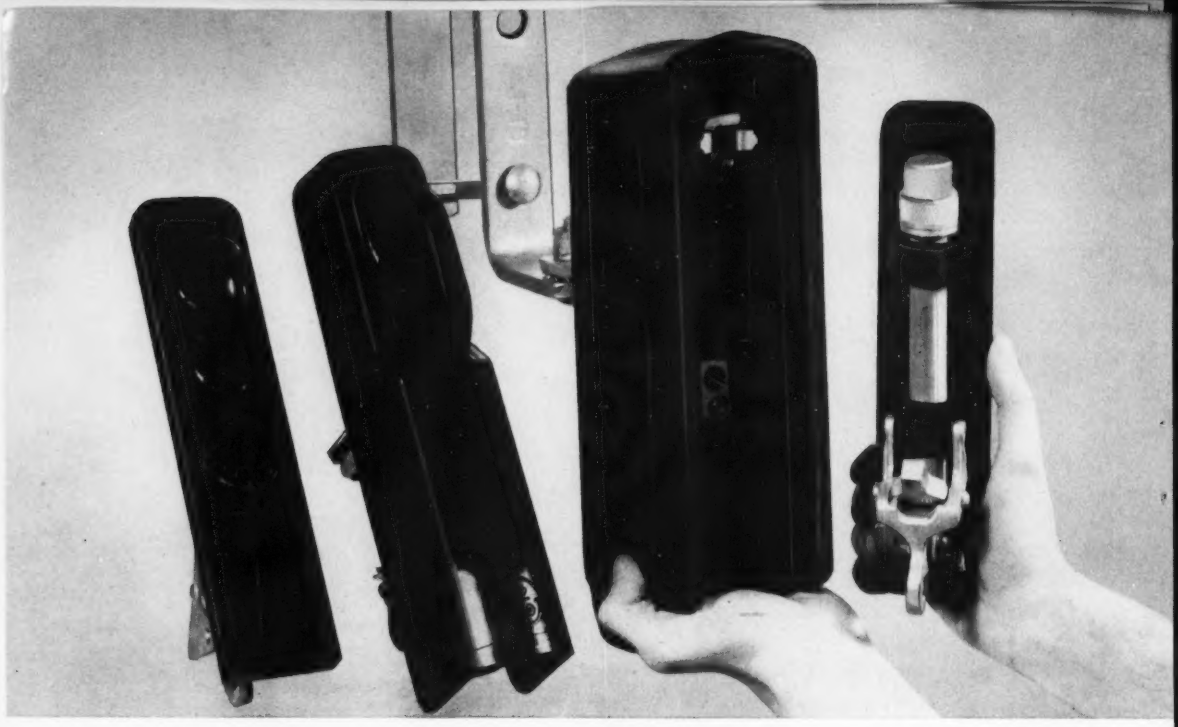
NEW PELLET ARRESTERS are valve-type arresters which offer unlimited interrupting capacity. You can apply the new HSBA transformers *anywhere* on the system without regard to system short-circuit current. The new arresters also have a combination of low sparkover voltage and low IR drop that holds lightning voltages to extremely low levels, providing an unequalled margin of protection. Because valve-type arresters are not eroded by discharges, the protection lasts *indefinitely*.

OTHER FEATURES. In addition, the HSBA transformer has all the advantages of the HS transformer including Nitrile sealing, a one-piece cover band, superior paint finish, Spirakore design.

For more information about these improved G-E transformers see your nearest G-E Apparatus sales office. Or write General Electric Company, Schenectady 5, New York.

402-125

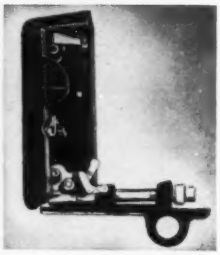
GENERAL ELECTRIC



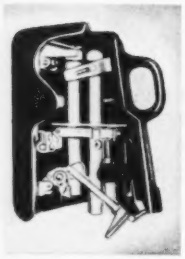
Four cutouts in one

by simply changing doors

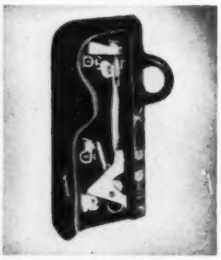
Indicating



Drop-out



Reclosing



Disconnect

A G-E FEATURE SINCE 1937! By stocking only three interchangeable doors which fit both 5.2- and 7.8-kv, 50-ampere housings, you get the 4 operating functions illustrated at the left. Available also in 100-ampere ratings, this unique flexibility reduces inventory and simplifies stocks.

INDICATING OR DROPOUT WITH A TWIST OF THE WRIST! A small wire yoke, easily inserted or removed, determines whether the fuseholder door "kicks out" at the bottom for visual indication, or drops open—either way giving positive evidence of a blown fuse.

RECLOSING DOOR AVOIDS UNNECESSARY SERVICE TRIP! The two-element reclosing door restores service within one second after a temporary fault blows the first fuse link. By saving a service trip, the two-shot cutout pays for itself the first time it operates!

FLEXIBLE DISCONNECT BLADE CAN'T GET LOST! It's fastened to the door—can't be misplaced. This disconnect blade doubles the continuous current rating of the cutout. When the blade is disconnected and the door closed, the flexible cable extends downward to indicate that the circuit is open.

WHAT'S MORE THE CUTOUT IS LIBERALLY DESIGNED—has high dielectric strength, uses silver-plated contacts, provides full-range interruption of fault currents, and is conservatively rated. All live parts are completely enclosed for maximum safety.

For complete information contact your G-E Apparatus sales representative, or write for Bulletin GEA-3448. General Electric Company, Schenectady 5, N. Y.

406-44

GENERAL ELECTRIC

A Pinch of Salt . . .

Remember how your grandmother always topped off her recipes with "a pinch of salt?" It was not, by any means, one of the essential ingredients; yet, without it the result would be flat and tasteless—it was that little added touch that made for success.

That's the way it is with membership in the P.C.E.A.! There are many other "ingredients" that are much more essential to your success; but, if you have the right recipe, your PCEA membership is the "pinch of salt" which adds the finishing touch.

Now, more than ever before, we all need the benefits that derive from exchanging ideas, and from coordinating our efforts toward the solution of our problems. The PCEA is the medium through which this is being accomplished by 265 company members, and nearly 3,500 individual members. It can serve you, too.

You have your own recipe for success, but try adding a pinch of salt—join the PCEA—and you will find a new zest in it. Don't put it off, write or phone the nearest office for full details NOW.

PACIFIC COAST ELECTRICAL ASSOCIATION, INC.

447 SUTTER STREET, SAN FRANCISCO 8, CALIFORNIA, DOuglas 2-1556
601 WEST FIFTH STREET, LOS ANGELES 17, CALIFORNIA, MUtual 3848

Associations Accomplish Those Things Which Most People Think Just Happen

Pretty...
with a purpose!

Here's a single-feeder substation that solves real estate, as well as other power distribution problems.

Good looks quickly overcome community objections to substation structures. Underground leads, with all live elements securely locked behind dead-front doors, provide *complete safety* . . . eliminate the need for fencing.

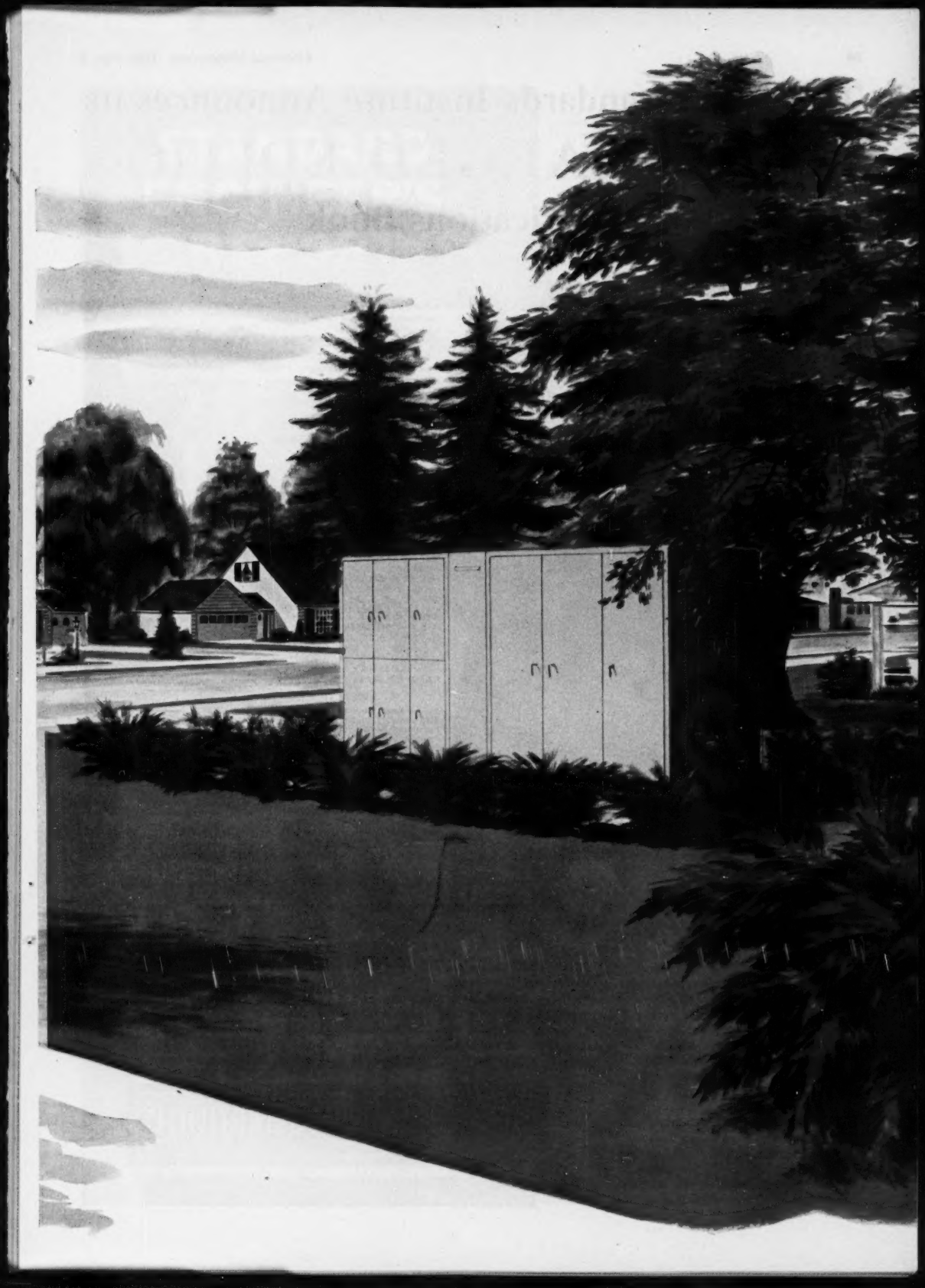
Co-operatively designed by Westinghouse and one of the nation's leading utilities, this is a complete substation. It includes high-voltage switching, transformer, low-voltage breaker, and complete protection. All parts are factory tested, co-ordinated and assembled. Quick and easy installation, too! Delivered to you as one item, instead of sixty or more, it minimizes the problems of field erection.

Further economies are effected by the compact design, requiring smaller plots of land with a single foundation mat.

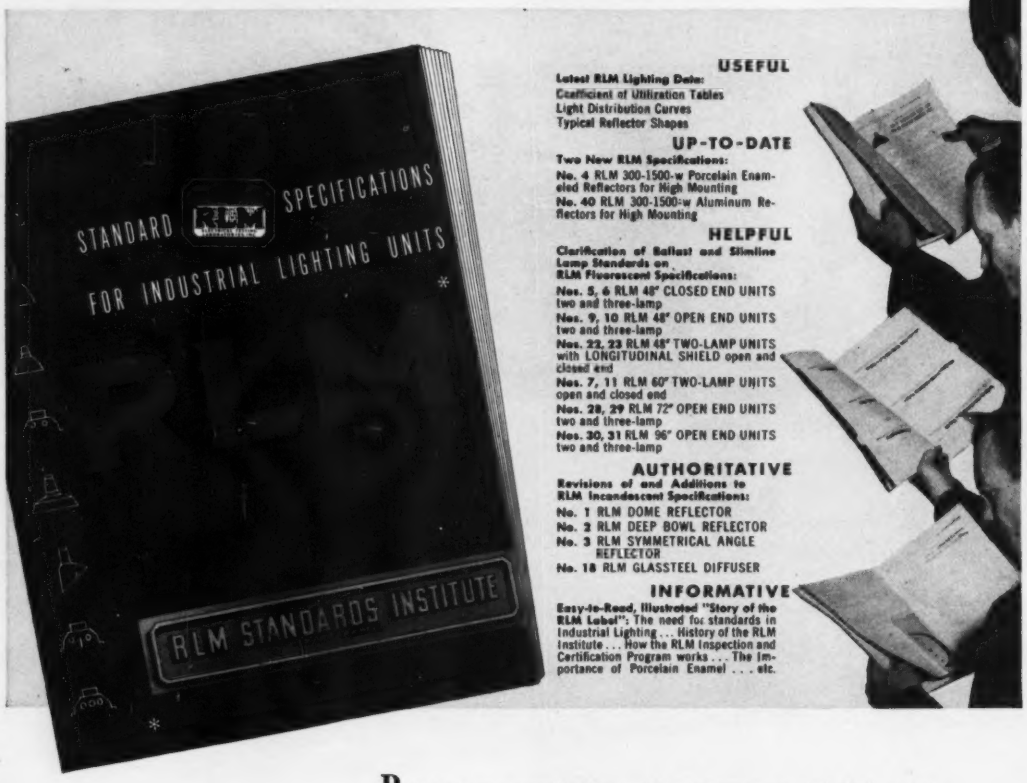
Contoured design units, as illustrated, are available in the 25-kv class and below, 1,000 to 3,000 kva. For complete information, contact your Westinghouse representative, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70633

YOU CAN BE SURE... IF IT'S
Westinghouse
"CSP" POWER TRANSFORMERS

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver



The RLM Standards Institute Announces its 1952 ENLARGED EDITION of the RLM Specifications Book


STANDARD SPECIFICATIONS
FOR INDUSTRIAL LIGHTING UNITS
RLM STANDARDS INSTITUTE
USEFUL
Latest RLM Lighting Data:
Coefficient of Utilization Tables
Light Distribution Curves
Typical Reflector Shapes
UP-TO-DATE
Two New RLM Specifications:
No. 4 RLM 300-1500-w Porcelain Enameled Reflectors for High Mounting
No. 40 RLM 300-1500-w Aluminum Reflectors for High Mounting
HELPFUL
Clarification of Ballast and Slimline Lamp Standards on RLM Fluorescent Specifications:
Nos. 5, 6 RLM 48" CLOSED END UNITS two and three-lamp
Nos. 9, 10 RLM 48" OPEN END UNITS two and three-lamp
Nos. 22, 23 RLM 48" TWO-LAMP UNITS with LONGITUDINAL SHIELD open and closed end
Nos. 7, 11 RLM 60" TWO-LAMP UNITS open and closed end
Nos. 28, 29 RLM 72" OPEN END UNITS two and three-lamp
Nos. 30, 31 RLM 96" OPEN END UNITS two and three-lamp
AUTHORITATIVE
Revisions of and Additions to RLM Incandescent Specifications:
No. 1 RLM DOME REFLECTOR
No. 2 RLM DEEP BOWL REFLECTOR
No. 3 RLM SYMMETRICAL ANGLE REFLECTOR
No. 18 RLM GLASSTEEL DIFFUSER
INFORMATIVE
Easy-to-Read, Illustrated "Story of the RLM Label": The need for standards in Industrial Lighting . . . History of the RLM Institute . . . How the RLM Inspection and Certification Program works . . . The Importance of Porcelain Enamel . . . etc.

Published as a contribution to the advancement of the Science of Industrial Lighting, and as an aid to everyone who buys, sells, recommends or specifies Industrial Lighting Equipment.

You are invited to obtain your complimentary copy of this latest reference work on industrial lighting equipment. Architects, lighting engineers, electrical contractors, etc. recognize the RLM STANDARD SPECIFICATIONS BOOK as an authoritative aid in the specification, recommendation and purchase of industrial lighting units. It is the only industrial lighting book which helps evaluate lighting units in terms of illumination, construction and performance standards. Further, the RLM Specifications Book provides ready-made specifications which assure industrial lighting units that meet approved minimum standards of quality.

The 1952 Edition is designed to be even more helpful. It contains newly-approved specifications and latest revisions, and for the first time, valuable coefficient of utilization and light distribution data. Thus the user has at his fingertips the *complete picture* on each RLM unit. If your work is concerned with industrial lighting equipment, a copy of the 1952 Edition RLM SPECIFICATIONS BOOK is available to you without cost or obligation. Write RLM Standards Institute, Suite 815, 326 West Madison Street, Chicago 6, Illinois, for your free copy.

RLM STANDARDS INSTITUTE
INCORPORATED
The letters RLM stand for Reflector and Lighting Equipment Manufacturers

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT Calol O.H.T. Grease

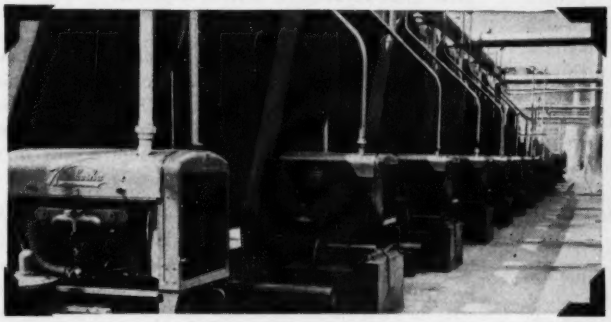
UNIT High-speed ball bearings

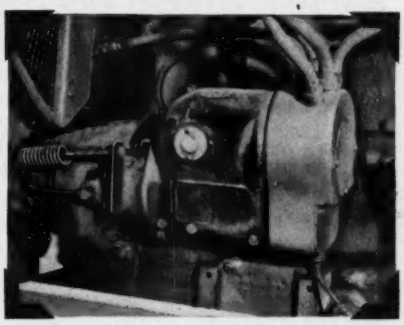
OPERATION Magnetos

CONDITIONS 160 F. ambient temp.—high speed, constant load

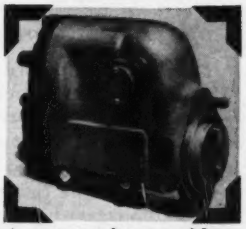
FIRM Sunray Oil Corp., Newhall, Calif.

Anti-friction-bearing-maintenance work cut in half!



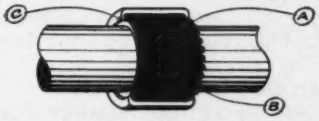


144 HIGH-SPEED BEARINGS in 72 magnetos on various types of engines required servicing at 1- to 3-month intervals until Calol O.H.T. Grease was used on them. Now they are serviced only at intervals of 3 to 6 months, although heat from the continuously operating engines keeps "drive-end" bearings at an average temperature of 160°F. Three other brands of comparable type grease tried by Sunray Oil Corp., owners of the engines, would not stay put on the magneto bearings under these tough conditions. Calol O.H.T. Grease has lubricated bearings satisfactorily in temperatures up to 400°F.



IN SERVICE TWO YEARS in the "hot end" of the magneto at right, this bearing is still in good condition. It was lubricated twice yearly with Calol O.H.T. Grease. This special grease for bearings is recommended for all types including sealed bearings in electric motors and generators. Use it anyplace where extended service is required or oxidation and high temperatures may be a problem.

How Calol O.H.T. Grease protects bearings in severest operating conditions



Used in any type of bearing under any operating condition, high temperature-low speed, high speeds to 10,000 rpm, temperatures from minus 10° F. to 400° F., CALOL O.H.T. Grease will last indefinitely.

A. Contains special oxidation inhibitor—helps prevent rusting, corrosion, hardening of grease at any time.

B. Resists high temperatures—eliminates coking and formation of deposits.

C. Provides excellent seal against water... lubricates efficiently in slight moisture.

FREE CATALOG: "How to Save Money on Equipment Operation," a new booklet full of valuable information, is ready for you. Write or ask for your free copy today.

TRADEMARK "CALOL" REG. U.S. PAT. OFF.

CALOL

STANDARD TECHNICAL SERVICE checked this product performance. For expert help on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative; or write Standard Oil Company of California, 225 Bush St., San Francisco.

STANDARD OIL COMPANY OF CALIFORNIA

How you can use RM-ASA Power Transformers where "specials" seem to be required

...and get several months faster shipment and up to 8% lower price

Many power transformer applications require voltages, impedances, and tap arrangements which apparently can be provided only by non-standard transformers. Often, you can meet these requirements with G-E RM (Repetitive Manufacture) transformers which conform to the new ASA standards. At the same time, you obtain attractive savings in both time and money. For example, with RM-ASA Transformers...

YOU CAN OPERATE AT NON-STANDARD VOLTAGE:

One optional feature of RM-ASA transformers provides that the high-voltage rating for each insulation class above 5 kv can be varied over a 20% range. This means, also, that by under-exciting you can obtain secondary voltages other than EEI-NEMA Preferred Voltage ratings. There may be some sacrifice in rating, of course—but you will get more kva per dollar than with a special transformer.

Example: You have a standard 34.5-kv primary, but want a non-standard low voltage of 2300. Select an optional RM-ASA rating of 36 to 2.4 kv. Operate at 34.5 kv. You'll get your 2300 volts.

You pay 1% for the optional high voltage. You save 8% in base price. You get faster delivery.

YOU CAN GET ALL TAPS ABOVE OR BELOW THE ACTUAL PRIMARY VOLTAGE:

With RM-ASA transformers, you get two taps above and two below the rated primary voltage. By selecting an optional primary rating, you can get all four taps above (or all below) your actual line voltage.

Example: Your high voltage is 34.4 kv. You want all taps below this. By selecting 32.8 kv for the primary rating, you get taps at 34.4, 33.6, 32.0 and 31.2 kv.

You pay 1% for the optional voltage. You save 8% in base price. You get faster delivery.

YOU CAN PARALLEL TRANSFORMERS WITH DIFFERENT IMPEDANCE:

Impedances of RM-ASA transformers are fixed at 5.5% to 7.0%, depending on high voltage. While this affects division of load when an RM-ASA unit is paralleled with an existing transformer, it is not as critical as you might think. It seldom results in a serious loss of capacity.

Example: You want to parallel a 34.4-kv RM-ASA transformer (impedance, 6%) with an existing unit having an impedance of 6.6%. Theoretical division of load is about 52%—48%. Often actual division will be even better than this because of external impedances. At worst, you have lost less than 5% in capacity. You have saved 8% in cost, gotten faster delivery.

YOU CAN PARALLEL △-Y WITH Y-△

While in most ratings, RM-ASA transformers are available as △-Y or △-△, a △-Y RM-ASA transformer can almost always be paralleled with an existing Y-unit. In fact, there is one advantage: You can ground the high side through the old unit, the low side through the new RM-ASA unit.

YOU HAVE 20 OPTIONS AVAILABLE:

These include: optional primary voltages—load-ratio-control—bushing current transformers—fans or provisions for future fans—junction boxes, and many others. RM-ASA power transformers are available in ratings up to 5000 kva single-phase and 10,000 kva three-phase. The ratings cover all EEI-NEMA Preferred Voltages—high and low—69 kv and below.

Let us help you apply RM-ASA transformers. For additional information, contact your nearest G-E representative. *General Electric Co., Schenectady, N. Y.*

401-33

GENERAL ELECTRIC

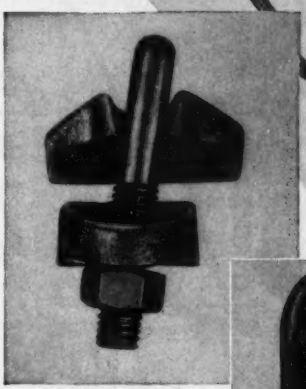
With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

Dependable

MIF GUY CLAMPS

Never let a guy down!

- **GREATER HOLDING POWER**
  Clamping force increases as load increases. "Come-along" type grip minimizes human element in installation.
- **GREATER EASE OF INSTALLATION**
  Can be placed on strand in a matter of seconds. Holds strand in proper position while nuts are being tightened.
- **GREATER FLEXIBILITY**
  Each size accommodates a wide range of strand diameters. Substantial savings in handling and inventory.
- **GREATER ECONOMY**
  Low weight and cost per unit of holding power.



PAX67 Clamp rated 12,500 lbs. Note relative position of parts during tilting. Separating Block and Clamping Plate remain parallel at all times.

MIF UNIVERSAL CLAMPS

PAX64C accommodates ⅜"-⅝" dia. strands.

This series of clamps offers same unusual performance characteristics with added advantage of equal clamping surfaces on both wires. Particularly recommended on conductors or for general use where system standardization is desired.

SPECIFICATIONS

Cat. No.	#Rating lbs.	Strand Dia. Range	Wgt. Per C Pcs.
PAX64	7,500	⅜"-⅝"	55 lbs.
*PAX67	12,500	½"-⅝"	122 lbs.
*PAX64C	7,500	⅜"-⅝"	67 lbs.
PAX67C	12,500	½"-⅝"	142 lbs.

* Illustrated
#PAX64 & PAX64C Based on tests with nuts tightened to 45 ft./lbs.
PAX67 & PAX67C Based on tests with nuts tightened to 85 ft./lbs.

MALLEABLE IRON FITTINGS CO.

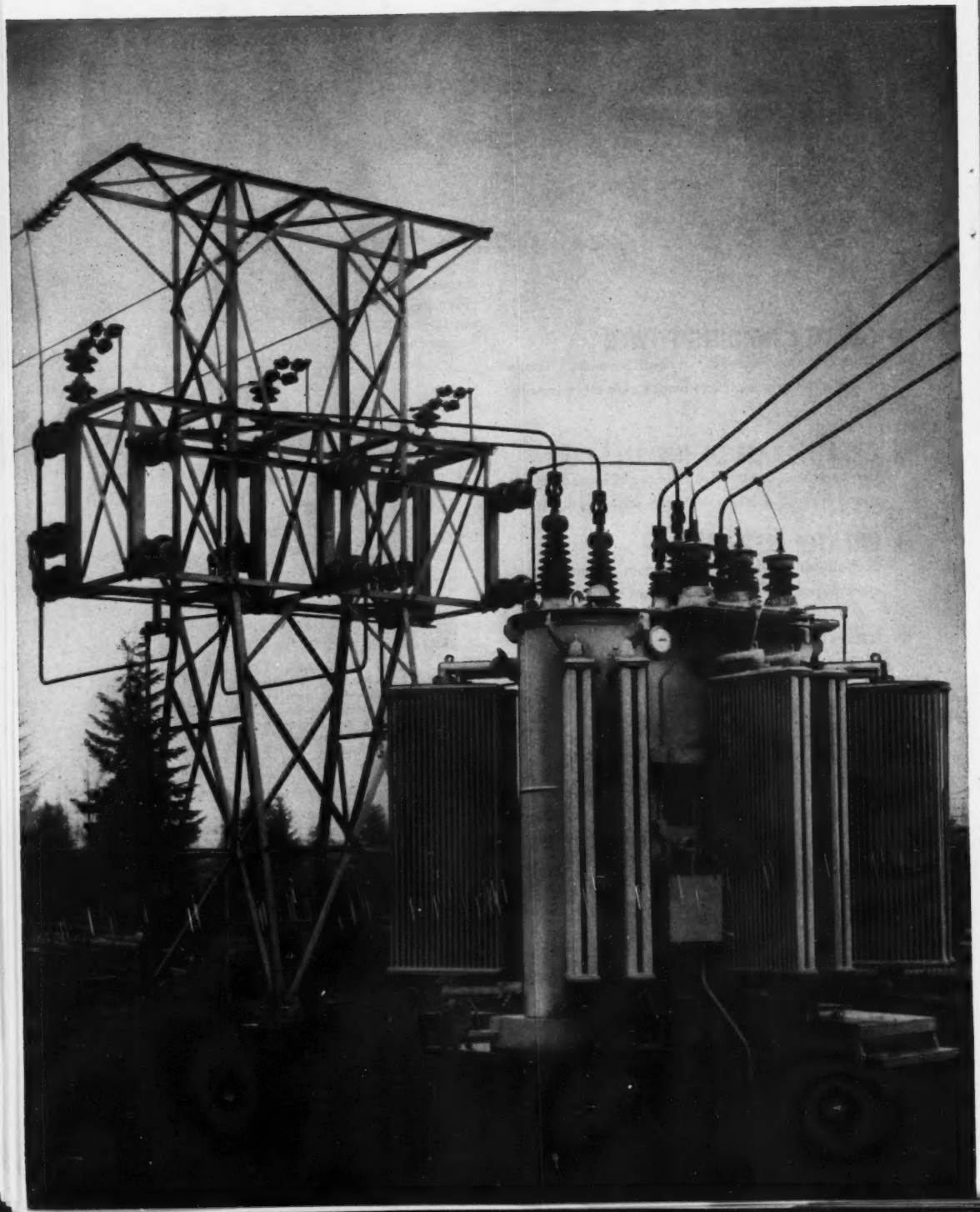
Pole Hardware Division Branford, Connecticut

N. Y. Office: 30 Church St.
Canadian Mfr. & Dist.: LINE & CABLE ACCESSORIES, Ltd. TORONTO

MIF

WESTERN REPRESENTATIVES
WM. J. COTTRELL CO., 11341 S. W. Pacific Hwy., Portland 19, Oregon
INDUSTRIAL ENGR. & EQUIP. CORP., 720 Subway Terminal Bldg., Indianapolis 4, Ind.
WALTHAM, DeWITT & KRUSI, 630 Monadnock Bldg., San Francisco 5, Cal.

more power



for the pacific northwest

In an area like the Pacific Northwest, a very highly electrified area, dependable equipment is a must. That's why you'll find many Kuhlman Transformers located in key positions throughout this area.

This 3000 KVA, 3 phase, power transformer rated at 66/33 KV, plays a vital part in helping a major Pacific Northwest utility serve its many customers.

Kuhlman "know-how" began back in 1894 and for 58 years has been developing steadily. For years many engineers believed that transformer development had reached its peak. But in 1935 Kuhlman introduced the famous Bent Iron Core, the predecessor of all wound type designs. Many Kuhlman developments followed; the "Quick-Grip" bushing, oil impregnation of coils, and the forerunner of the modern series street lighting transformer.

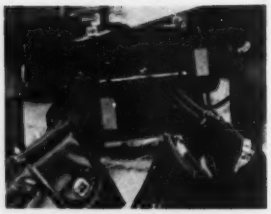
Specify Kuhlman. Write us for the name of the Kuhlman representative in your area. For more information about power transformers, ask for Bulletin CS-601.

Kuhlman

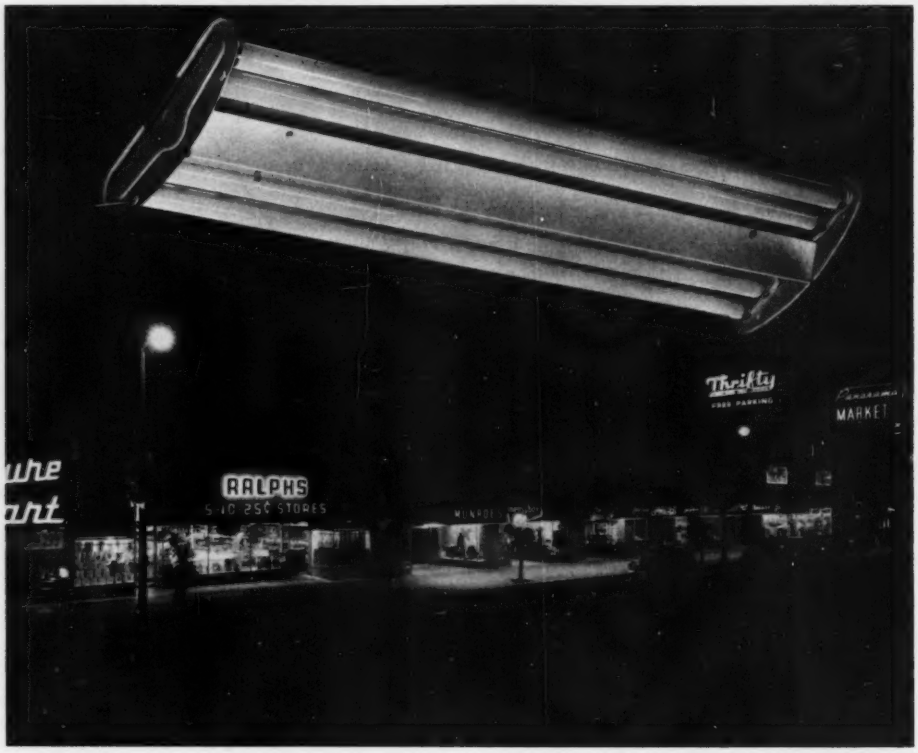
KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

The complete Kuhlman line includes Distribution, Dry Type, Power, Saf-T-Kuhl, and specialty units.

EXPORT REPRESENTATIVES: *International Standard Electric Corporation,* 67 Broad Street, New York 4, N. Y. Cable address: Microphone, N. Y.



SHOPPING FOR GREATER LIGHTING EFFICIENCY?



SUNBEAM'S new, decorative, open-type commercial, the 1260 series, is your best buy in direct lighting today. Here, at last, is a unit which combines modern appearance for commercial interiors with the high level of direct illumination as "strip" lights. It is especially designed for stores, markets and other merchandising areas. What is more, these are the fixtures to specify for installations where minimum maintenance is prerequisite. Because of the wide lamp spacing and shallow cross-section (only 4" deep) the 1260 series will do a better lighting job in low ceiling areas. Adequate knockouts are provided for various mounting methods, ceiling or pendant. Available for two and four lamp 40W fluorescent and 48", 72" and 96" slimline (200 or 430 MA).

SUNBEAM LIGHTING COMPANY • 777 EAST 14TH PLACE • LOS ANGELES 21, CALIF.

An important splice in progress on a 3/c, 500 MCM, 26,400 V shielded paper-lead feeder cable for Public Service Electric and Gas Company's new Warren Point Substation at Fairlawn, N. J.

PUBLIC SERVICE

Public Service Electric and Gas Company insures continuity of service with NATVAR Splicing Kits

Veteran splicers in the Underground Department like Natvar splicing kits, because they provide exactly the right number of rolls of v.c. tape cut to proper lengths and widths, and exact quantities of other materials required for the job. Engineers and foremen like the kits because they give close "quality control" of the splicing operation, with a minimum of waste and spoilage.

Public Service is working around the clock to provide adequate service for one of the fastest growing areas in the country. Long range planning demands that additional facilities to meet the increasing load be built on a permanent basis.

For this reason, extreme care is exercised in the selection of equipment and materials for the expansion program. Natvar splicing kits, made up in units for various sizes and types of cable, speed underground splicing because of their convenience and insure uninterrupted service because of the uniformly high quality of the materials.

All Natvar flexible insulations have excellent physical and electrical characteristics, and are dependably uniform, no matter where or when purchased. They are available either from your wholesaler's stock or direct from our own.

Natvar

Natvar Products

- Varnished cambric—straight cut and bias
- Varnished cable tape
- Varnished canvas
- Varnished duck
- Varnished silk
- Varnished special rayon
- Varnished Fiberglas cloth
- Silicone coated Fiberglas
- Varnished papers
- Slot insulation
- Varnished tubing and sleeving
- Varnished identification markers
- Lacquered tubing and sleeving
- Extruded plastic tubing and tape
- Extruded plastic identification markers

Ask for Catalog No. 22

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FORMERLY THE NATIONAL VARNISHED PRODUCTS CORPORATION

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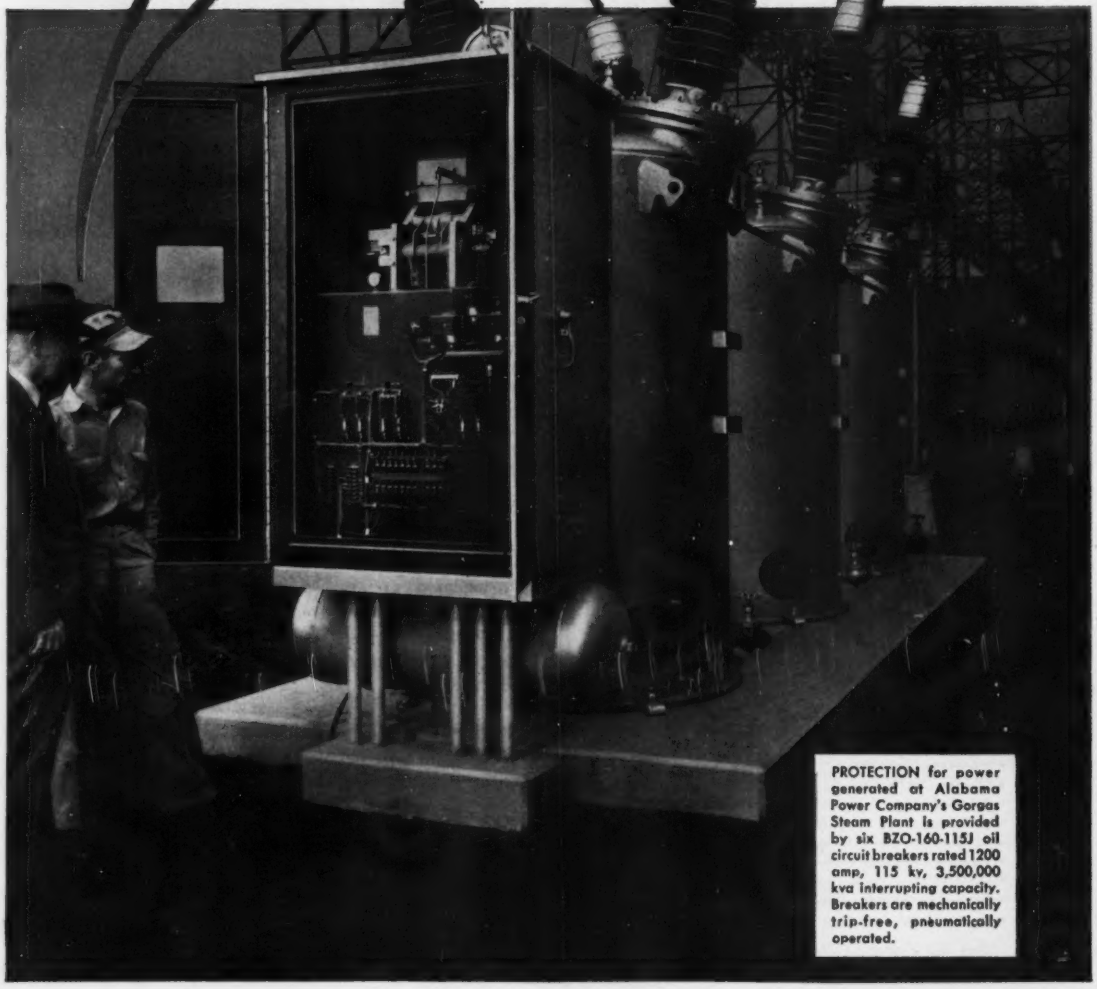
Represented by Electrical Specialty Co.

San Francisco 3, 316 Eleventh St. — Los Angeles 13, 418 East Third St. — Seattle 4, 2406 First Ave. So. — Denver 2, 1015 21st St.

Fast, Positive

WITH MECHANICALLY TRIP-



PROTECTION for power generated at Alabama Power Company's Gorgas Steam Plant is provided by six BZO-160-115J oil circuit breakers rated 1200 amp, 115 kv, 3,500,000 kva interrupting capacity. Breakers are mechanically trip-free, pneumatically operated.

Performance!

FREE PNEUMATIC OPERATION

Power OIL CIRCUIT BREAKERS

ELECTRIC POWER is vital today for defense, for industry and to domestic life. Uninterrupted service contributes to continuous production... helps prevent costly shutdowns. Greater concentrations of electric power make it essential that faults be quickly cleared and service instantly restored.

Helping to maintain power stability of systems across the country are Allis-Chalmers power circuit breakers with mechanically trip-free pneumatic operators. These circuit breakers provide:

Positive, High-Speed Opening — that's the function of the mechanically trip-free mechanism! Tripping always uncouples contacts from the closing mechanism... powerful accelerating spring, aided by gravity, drives contacts open. All possible drag is eliminated.

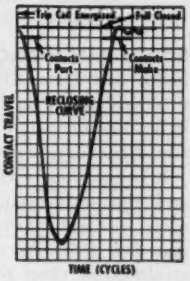
Positive, High-Speed Closing — accomplished with powerful pneumatic operation. Stored energy, enough for at least five closing operations, comes from a self-contained air compressor and tank.

Positive, High-Speed Reclosing — provided by the fast coupling action of the mechanically trip-free mechanism and the fast-acting power of pneumatic operation. Meets the power industry's fastest reclosing requirements.

Over ten years' experience in the field has proven the success of mechanically trip-free pneumatic operation for power oil circuit breakers.

For more information on these power circuit breakers, call your nearby Allis-Chalmers sales office, or write Allis-Chalmers, Milwaukee 1, Wis. Ask for Bulletin 71B6022C.

A-3607



MECHANICAL TESTS supplement electrical tests. Mechanical performance is verified by special test equipment. The man on the breaker shown above is checking a special speed recorder called a Speedgraph. With this device contact travel vs time is recorded on a synchronized rotating drum. The graph at right is typical for the first or subsequent reclosures.

ALLIS-CHALMERS

MECHANICALLY TRIP-FREE PNEUMATIC OPERATOR IS STANDARD EQUIPMENT ON ALL THESE ALLIS-CHALMERS OUTDOOR POWER OIL CIRCUIT BREAKERS

Unitop is an Allis-Chalmers trademark.

Type FZO-150 *Unitop* breaker 14.4 to 46 kv, 8-cycle opening, 20-cycle reclosing*

Type FZO-151 ... 69 kv, 5 or 8-cycle opening, 20-cycle reclosing*

Type BZO-160 ... 69 kv, 8-cycle opening, 115 to 230 kv — 3 or 5-cycle opening with 20-cycle reclosing*

*20-cycle reclosing standard for 600 and 1200 amp breakers

These Two Fabricating Works Specialize in Transmission Towers

SEATTLE—The Bethlehem Pacific Fabricating Works on East Marginal Way in Seattle is one of two Bethlehem Pacific plants specializing in steel transmission towers. Besides its complete facilities for fabricating and galvanizing tower components this works includes shops for fabricating buildings, bridges and other steel structures.

Bethlehem Pacific's Seattle steel plant is conveniently located for supplying steel to this fabricating works.

SOUTH SAN FRANCISCO—Located on South San Francisco's Industrial Way, this Bethlehem Pacific Fabricating Works is devoted entirely to the production of steel transmission towers.

It is equipped to fabricate, galvanize, and test transmission towers on any scale. It is laid out so that structural steel can flow from the company's adjacent steelmaking plant directly through the fabricating shop and galvanizing department to the shipping yard.

BETHLEHEM STEEL

In addition to the mechanical equipment of these two plants, Bethlehem Pacific has a large staff of engineers experienced in every phase of tower work. These men can design or assist in designing steel towers to meet any requirement.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

Sales Offices: San Francisco, Los Angeles, Portland, Seattle, Honolulu

BETHLEHEM PACIFIC

Facts from MONTANA

"'CSP' Transformers cut failures 50 to 1"

"We have been using 'CSP' Transformers for the past ten years," says a Montana Utility. "One of our divisions now has about 1,000 'CSP' Transformers in service, and an equal number of the conventional type.

"Of all our 'CSP' Transformers, we have lost but one from lightning. During this 10-year period, we have been losing an average of five conventional transformers per year. That means a ratio of approximately 50 to 1 in favor of the 'CSP'."

Old standards for judging transformers were discarded when the "CSP" (Completely Self-Protecting) Transformer was introduced. The "CSP" Transformer, with both lightning and thermal protection built in, has slashed costs, cut maintenance, and improved service continuity. Its reputation has been won by performance in the field, in instances like this one—records that have made it first choice with utilities coast to coast.

Installation and maintenance costs for Westinghouse "CSP" Transformers are always lower, because complete protective equipment is built in, not separately mounted. A two-year survey of Electric Light and Power Companies developed the National Averages shown at left.

NATIONAL AVERAGES

	"CSP"	Conventional
Installation Costs	$13.87	$24.74
Burn-out Rate	0.257%	1.005%
Fuse Outages	None	5.64% @ $6.52 per outage
Load Checks	Automatic	12.8%
Breaker Reset	1.02%	None

If you'd like to check your own costs against these national averages, ask your Westinghouse representative for Booklet B-4247-B, "Transformer Costs and Their Relation to Profits". Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

"CSP" devices . . . originated and patented by Westinghouse

YOU CAN BE SURE . . . IF IT'S Westinghouse

"CSP" DISTRIBUTION TRANSFORMERS

J-70591-A

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

Now!

HEAVY-DUTY DAY-BRITE CONSTRUCTION PLUS CFI*

*COMFORT FOR INDUSTRY

These scientifically designed *aperatures* make the difference—give the ideal 10% upward component of light.

...the first practical answer to industry's need for comfortable lighting

Number one consideration in industrial lighting has always been rugged, durable construction . . . often at the expense of comfortable illumination. But in the past Day-Brite has consistently demonstrated that highest standards of lighting and highest standards of construction can be combined.

Now, after two years of research and study, we're ready to announce *another* great advance in industrial lighting.

To give industry even more comfortable and vision-saving illumination, Day-Brite has completely redesigned its famous Day-Line industrial line. The new CFI Day-Line is *comfort* engineered to give 10% upward light distribution and put an end to the harsh brightness contrasts and dark ceilings that hamper workers.

Now, workers can enjoy freedom from irritation and nervous fatigue due to eyestrain. Now, management can reap the benefits of more production, less work spoilage, higher employee morale and lower accident rate.

All the familiar Day-Brite features are still there, of course—die-formed heavy gauge steel construction, porcelain enameled reflectors, vibration-proof Turret sockets. And yet, CFI Day-Line prices are actually lower . . . actually mean substantial savings on industrial lighting installations.

See the Day-Brite representative nearest you. Get the facts about the newest advance in plant lighting. Day-Brite, Inc., 5412 Bulwer Avenue, St. Louis 7, Missouri. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

"DECIDEDLY BETTER" DAY-BRITE *Lighting Fixtures*

YOU'LL FIND THE DAY-BRITE REPRESENTATIVE IN YOUR AREA HELPFUL AND COOPERATIVE:

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Mark Bryner—Thermal Engineering Co.
P. O. Box 446

SAN FRANCISCO 3, CALIF.
H. B. Squires Co.
156 8th St.

251

Charlie Vaughn reports:

"In 12 years I've never had a complaint on the LOCKE 6" Deadend!"

CHARLIE VAUGHN, our North Central Regional Manager, cut his eye teeth on the insulator business years ago in Georgia. Since then, he's sold and serviced insulators in every state east of the Mississippi, has bumped up against all kinds of operating conditions. With this background, Charlie can speak with authority on insulator performance. Incidentally, his Locke regional operation stretches from Wisconsin to Harrisburg, Pa., and south from Michigan to Kentucky.

"CURVATURE, CLEARANCE, THICKNESS,

make it the toughest 6" Disc on the market", says Charlie.

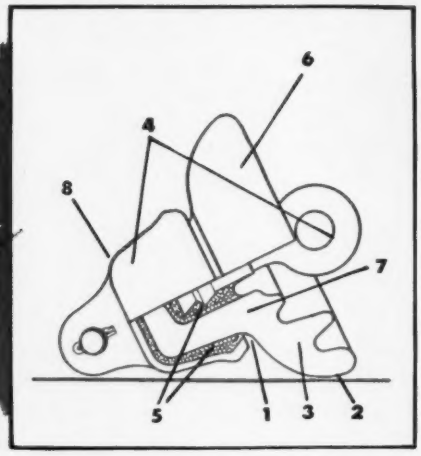
By Curvature, Charlie's talking about the way the Locke shell drops away from the cap at a larger angle than any other shells you've seen. This prevents breakage during shipment, and through various handling stages from our factory to your warehouse, and from warehouse to your job location.

By Clearance, Charlie means the spacing between the edge of the cap and shell. It's a good deal greater than normal. Charlie says this reduces the possibility of "donuting", helps insulator resist breakage when stresses are applied.

By Thickness, Charlie means the thickness of the porcelain shell in the sections at right angles to the surface of the porcelain. Charlie says this means that this 6" disc gives you a porcelain build-up other insulators don't have at points where you need it most . . . namely, points of greatest stress.

On next page Charlie illustrates these, and other advantages you get by using Locke 6" Deadends (our No. 16583) for your low voltage applications

Here Charlie Vaughn shows you why Locke's 6" Disc is the best insurance you can buy against breakage hazards—



1. Says Charlie, "Note larger clearance between edge of cap and shell. This prevents application of pressure on porcelain surface by edge of cap. This helps eliminate any chance of breakage."

2. "The top contour or curvature of porcelain has been so designed that the 'lay point' permits insulator to roll around in trucks, and across warehouse floors, without breaking," explains Charlie.

3. Charlie makes the point that "the thickness of the porcelain shell considerably exceeds that of conventional deadend insulators and thereby practically eliminates breakage".

4. "My customers are always impressed by the fact that the cap and pin are coated with the same coating we put on our high voltage insulators. It's Permazinc—Locke's quality-controlled hot dip galvanizing," says Charlie.

5. "Locke sand bands at the head of the porcelain shell put this zone in surface compression," says Charlie, "thus giving added strength and reliability."

6. "Another strength factor," reports Charlie, "is Locke Compression Glaze which makes the insulator stronger because of its ability to hold the surface in compression."

7. "No holds barred," asserts Charlie, "Locke Wet-Process porcelain is absolutely the best on the market. The answer is factory control operations. Come to our factory and see for yourself," Charlie always tells his customers.

8. "Electrical storms, snow and ice present no problems for our 6" disc," says Charlie. "Under these conditions, it simply has no equal."

YOU ARE EQUALLY SURE of getting a masterpiece of design when you specify other products in the complete line of Locke insulators and suspension hardware. Each pays off in superior performance on transmission and distribution lines, generating stations, sub-station and electrical apparatus. Locke Department, General Electric Company, Baltimore, Md.

LOCKE

LOW VOLTAGE PIN TYPE INSULATORS

HIGH VOLTAGE PIN TYPE INSULATORS

SUSPENSION INSULATORS

SWITCH & BUS INSULATORS

SPOOL INSULATORS

GUY INSULATORS

LIQUID-FILLED BUSHINGS

SUSPENSION & STRAIN CLAMPS

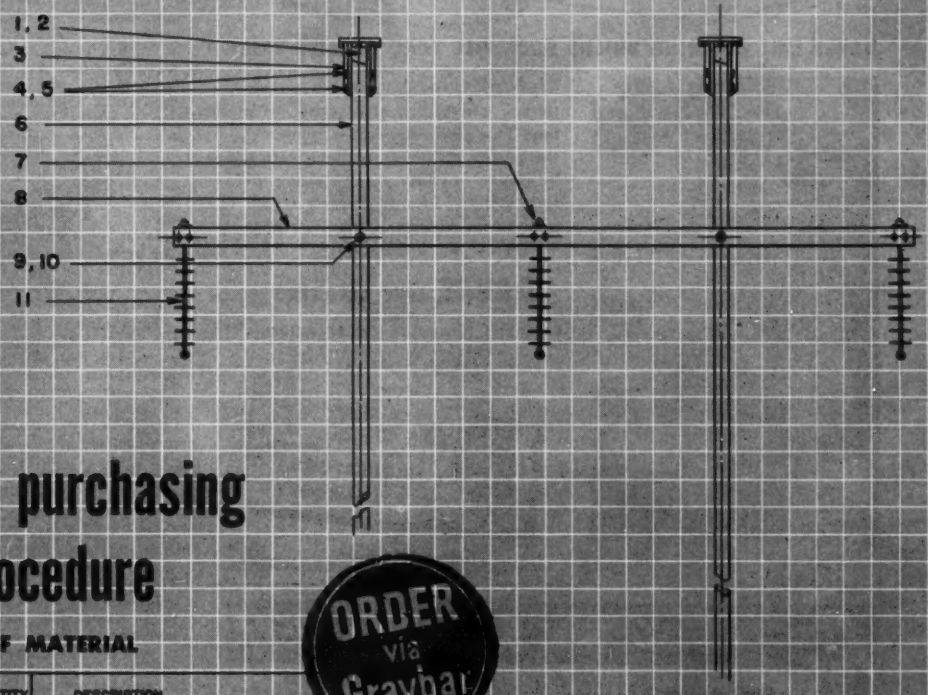
SUSPENSION HARDWARE

ENTRANCE BUSHINGS

ACCEPTED STANDARDS

...in construction practice

TANGENT — H. FRAME STRUCTURE — METAL SPACERS WITH STEEL STATIC WIRE SUPPORT



...AND purchasing procedure

ORDER via Graybar

LIST OF MATERIAL

DRG. REF.#	QUANTITY	DESCRIPTION
1	2	CLEVIS
2	2	SUSPENSION CLAMP FOR STATIC WIRE
3	2	STATIC WIRE SUPPORT
4	4	MACHINE BOLT 5/8"
5	4	MF LOCKNUT 5/8"
6	2	POLE
7	3	STEEL SPACER FITTING W/MOUNTING BOLTS
8	2	CROSSARM
9	2	STUD BOLT 7/8" W/2 WASHER NUTS
10	4	MF LOCKNUT 7/8"
11	AS REQ'D	SUSPENSION INSULATOR AND FITTINGS

With Graybar as your supplier, you take full advantage of a nation-wide distribution service. It's easy to order all of your transmission-line materials and supply requirements quickly and conveniently from a near-by Graybar office — it's the kind of standardization that saves time and paper work . . . assures you of quality products. *Graybar Electric Co., Inc. Executive offices: Graybar Building, N. Y. 17, N. Y.* 253-86

Call Graybar first for...

Graybar Everything Electrical

IN OVER 100 PRINCIPAL CITIES

One of a series of advertisements high-lighting the economies of standardization

Keep Harmony between Trees and Wires

DAVEY LINE CLEARING BUILDS GOODWILL THRU QUALITY WORK

WESTERN HOME OWNERS prize their trees . . . select their tree service with care. That's why they always appreciate the quality and safety of line clearing by Davey. For Davey line clearing insures safety of life and property as well as the trees' welfare and is the best as well as the best known.

DAVEY LINE CLEARING
DIVISION OF
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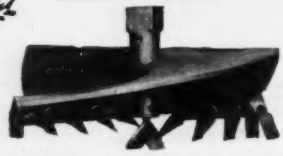
DAVEY ORIGINATORS OF TREE SURGERY

THESE PENGO PRODUCTS SAVE YOU MONEY!

THE PENGO EARTH AUGER



- Twin helix—no back thrust!
- Bores true, clean holes in any soil, most sandstones and hardpans, frozen ground, permafrost!
- All wearing parts replaceable on job!
- Made in 15 sizes, 10" to 54" hole diameters, to fit all makes of heavy-duty earth boring machines. Larger sizes on order.

THE PENGO CUTTING HEAD

- Easy installation—welds to your present helix.
- Bores where you never could before!
- Wearing parts are replaceable on the job and are interchangeable with PENGO Auger parts. *(Described at left.)*
- Made in 9 sizes, 8" to 24" diameters. Larger sizes on order.

THE PENGO WISDOM TOOTH

- All PENGO Augers and Cutting Heads are equipped with the drive-on PENGO Wisdom Tooth, specially designed for use on earth augers; cast from special abrasion and shock-resistant steel alloy for far longer service life!

"Get the PENGO WISDOM TOOTH— It knows how to bore holes!"

ORDER TODAY—OR SEND FOR LITERATURE, PRICES

PETERSEN ENGINEERING CO.
MANUFACTURERS
SANTA CLARA, CALIFORNIA

ELECTRICAL BOOKS

IES LIGHTING HANDBOOK, second edition, published by Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y., 987 pages, illustrated, $8 per copy. With a revision of 75% of the text technical material and 15% more pages than the original 1947 edition, the second edition of this well-known lighting reference is now announced. Revisions were made to incorporate the newest developments in lighting techniques, applications and theory. The book is thoroughly cross-indexed with a 24-page index covering more than 4,500 reference items. It contains 657 photographs, sketches and charts. The technical information is divided into 18 sections and there is a 37-page appendix, including tables and calculations.

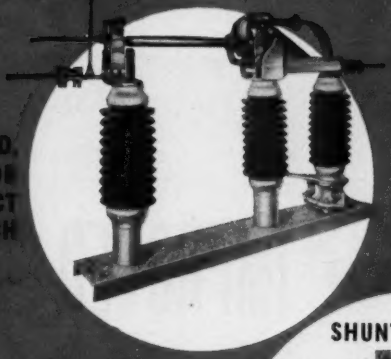
PRINCIPLES OF RADIO, by Keith Henney and Glen A. Richardson, sixth edition, 655 pages, 6x9, John Wiley & Sons Inc., $5.50. This edition has been completely revised. Emphasis is placed on the fundamentals of basic radio circuits. Experiments have been worked out in the laboratory and the problems are of the type likely to be encountered in practice. Chapters on frequency modulation, television, radar and wave-shaping circuits are included.

HIGH FREQUENCY TRANSMISSION LINES, third edition, by Willis Jackson, 152 pages, 4½x7, John Wiley & Sons Inc., $1.75. This is one of a series of Methuen's monographs on physical subjects. It is devoted to a consideration of the characteristic properties of lines and their applications in high-frequency technique, and the restrictions associated with the application of the transmission-line theory to high-frequency line systems, including 45 diagrams.

THE CONDUCTION OF ELECTRICITY THROUGH GASES, third edition, by K. G. Emeleus, 99 pages, 4½x7, John Wiley & Sons Inc., $1.50. Alterations were made in this edition with the aim of improving accuracy of the monograph in the light of advances in knowledge of gaseous conductors since the previous editions appeared.

ELECTRICAL MEASUREMENTS, by Forest K. Harris, 784 pages, 6x9, John Wiley & Sons Inc., $8. Based on a course of lectures and laboratory work, the book combines points of view of the practicing engineer, laboratory and research workers and student. It covers material from basic principles to applications within the field of d-c and low-frequency applications; origins, relations and dimensions of electrical units, basic instrument theory.

ANTENNAS: THEORY AND PRACTICE, by Sergei A. Schelkunoff and Harald T. Friis, 639 pages, 6x9, John Wiley & Sons Inc., $10. Antennas of various types and ranges, the basic ideas and techniques necessary to understand antenna behavior are included. The text combines discussion of antenna principles with the theory of radiation and applications; stresses physical ideas and pictures with the methods of quantitative analysis.



GROUP OPERATED, ROTATING INSULATOR TYPE DISCONNECT SWITCH

HERE IS KEARNEY EQUIPMENT . . .

Designed and Engineered with

Extra Capacity — in Anticipation of Meeting Today's Ever-Increasing Load Requirements

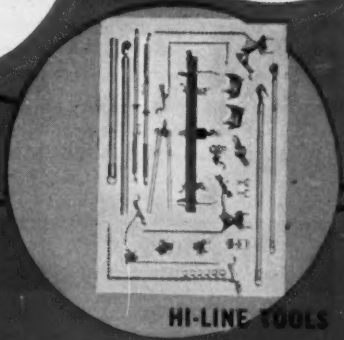
SHUNT CAPACITORS

FUSE LINKS

TRIP-O-LINK

TRIP-OUT

FOR MORE INFORMATION concerning this equipment designed for today's heavily loaded lines, SEE FOLLOWING PAGES . . .

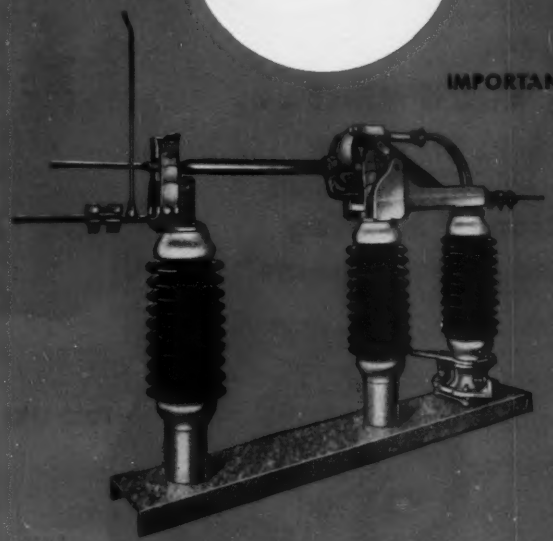


HI-LINE TOOLS

JAMES R. KEARNEY CORPORATION
4224-42 Clayton Avenue, St. Louis 10, Missouri
Canadian Plant: Guelph, Ontario

THE IMPROVED KEARNEY

GROUP OPERATED, ROTATING INSULATOR TYPE, VERTICAL BREAK DISCONNECT SWITCH WITH IMPORTANT DESIGN CHANGES FOR COOLER, MAINTENANCE-FREE OPERATION



These features assure dependable performance under every variety of operating conditions:

1. *Heavy leaf type beryllium copper spring contacts with silver overlay at both ends of blade.*
2. *Fully adjustable to compensate for any changes in switch mounting structure.*
3. *Positive current path to blade through blade contacts at both ends of switch. Hinge mechanism does not carry current.*

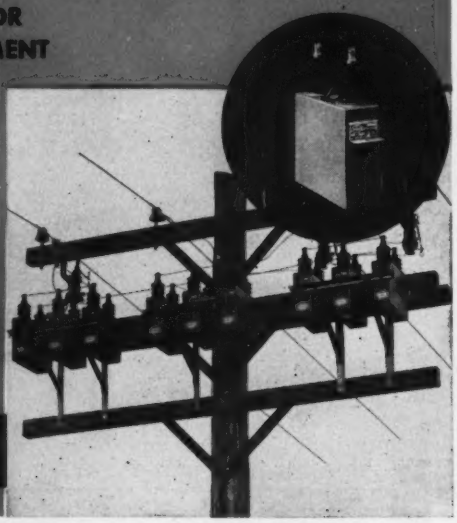
Write for more detailed information. Ask for bulletin No. 8-33.

KEARNEY SHUNT CAPACITORS

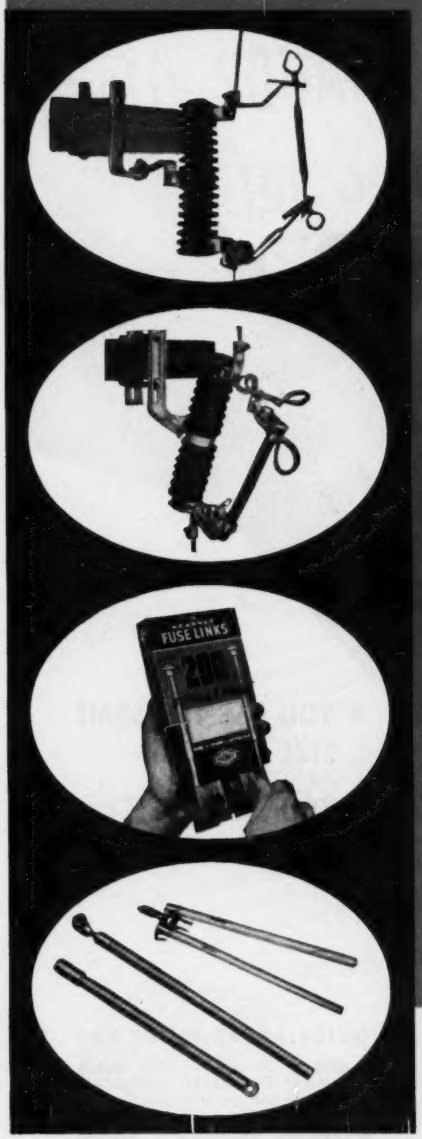
INVALUABLE DEVICE FOR POWER FACTOR CORRECTION AND VOLTAGE IMPROVEMENT

These shunt capacitors correct many undesirable conditions on heavily loaded lines. They release feeder capacity permitting addition of more customers, and increase KW-hours for added revenue, and they release substation capacity in correcting the power factor. The voltage improvement eliminates light flicker and dimness and keeps the voltage within normal operating limits to prevent damage to motors.

Kearney Capacitors feature such advantages as: (1) Protective Packaging, (2) Silicone Gaskets, (3) Askarel Dielectric Oil, (4) Hot Zinc Spray Tank. For additional information, write for bulletin No. 21-1.



Designed and Built with Extra Capacity



For LOW COST PROTECTION
It's the NEW KEARNEY TRIP-O-LINK

This new design features an additional petticoat for greatly increased insulation. With TRIP-O-LINKS' plated terminals you can accommodate either copper or aluminum wire with no danger of galvanic action, thus helping solve conductor problems in the event of a shortage.

The KEARNEY TRIP-OUT with Silver-to-Silver Contacts Accommodates Heavier Loads and Preserves Current-Carrying Efficiency

For heavy current faults there is no better open-type switch on the market today. The TRIP-OUT can be converted to a disconnect switch by the substitution of a disconnect blade for the fuse cartridge. All Kearney fuse cutouts are designed for this conversion.

KEARNEY TYPE 200 FUSE LINKS

For high, safe overload capacity, the Type 200 Fuse Link has no equal. These links open at approximately 200% of their continuous current rating in about 5 minutes. Good cutout performance depends a great deal upon the fuse link used. So, for maximum protection specify KEARNEY on your next fuse link order.

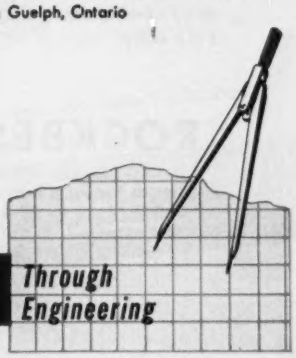
For Maximum Protection on Working Energized Lines—Use KEARNEY PLASTICKS

Check the many advantages of Kearney plastic-covered sticks over the conventional varnished variety before buying hi-line tools. Ask your Kearney Salesman or write for catalog.

JAMES R. KEARNEY CORPORATION
4224-42 Clayton Avenue, St. Louis 10, Missouri
Canadian Plant: Guelph, Ontario

West Coast Distributor:

MAYDWELL & HARTZELL
INCORPORATED
SAN FRANCISCO • LOS ANGELES • PORTLAND • SEATTLE



***KEARNEY** Gives a little More for a little Less*

Through Engineering

Pull 12 Conductors Where You Have 7 ... Use ROCKBESTOS PNR® Control Cable

Conventional 7-conductor #9 AWG in 1¼" conduit

PNR 12-conductor #9 AWG 1¼" conduit

- YOU USE THE SAME SIZE CONDUIT
- YOU SAVE STEEL

Because Rockbestos PNR Control Cable is 46%* smaller in area than competitive control cables, it enables you to put 12-conductor PNR where you would use 7-conductor cable. This means you save critical steel conduit and fittings, because you put more conductors in a given conduit. Write for the PNR story.

QUICK FACTS ABOUT PNR

- 46% smaller area*... 28% smaller diameters*. Use smaller conduit and fittings or put more conductors in present conduit.
- Dielectric breakdown ... over 40 times operating voltage.
- Lighter and smaller. Easier to handle, store, ship, pull through conduit.
- Flexible to —25°C (—13°F). No cracking!
- Rated 600 volts ... conductor operating temperature 75°C (168°F).

*Average determined by comparison with competitive control cable.

ROCKBESTOS PNR

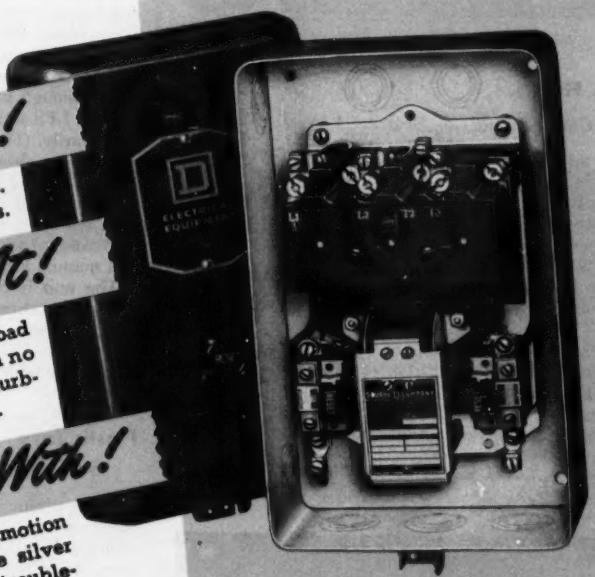
... another different, better cable by

ROCKBESTOS PRODUCTS CORPORATION, NEW HAVEN 4, CONN.

the originators of A.V.C.®

New York • Cleveland • Detroit • Chicago • Pittsburgh • St. Louis
Los Angeles • Oakland, California • New Orleans • Seattle

Specify SQUARE D Motor Starters for 3 Important Reasons



Easy to Wire!

Plenty of wiring space. Handy solderless terminals.

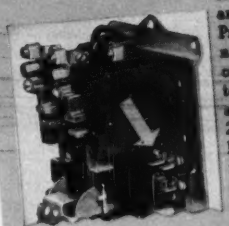
Easy to Get At!

Coils, contacts or overload relays can be changed in no time at all—without disturbing external connections.

Easy to Live With!

Straight line guided motion minimizes wear; large silver alloy contacts insure trouble-free electrical performance.

"Off-the-Shelf" Parts Kits make normal maintenance easier than ever. Each kit contains parts necessary to replace all load contacts and finger springs. An illustrated service bulletin is enclosed to provide quick parts identification and complete installation instructions.



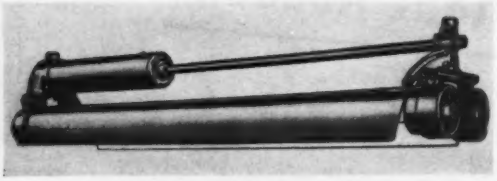
ELECTRICAL INTERLOCKS are available in kit form. Practically any necessary number or arrangement of extra interlock contacts can be added to any standard starter. Sizes 2 and 3 starters will soon have new front-of-panel mounting interlocks for easier installation. *(See cutaway at left)*

Write for Bulletin 8536.
Square D Company, 4041 N. Richards Street, Milwaukee 12, Wisconsin.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

PRODUCT NEWS



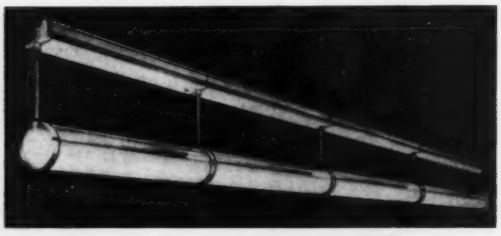
Slimline Fixture

(1) Crouse Hinds Co., Syracuse 1, N. Y.

The new series type EVF explosion-proof fixtures are for 36-w, 48-in. T-12 slimlines and come for two, three and four lamps. The fixtures consist essentially of two, three or four lamp-enclosing tubes of explosion-resisting Pyrex glass sealed into cast aluminum end fittings containing the sockets. A cast aluminum ballast housing is mounted above the lamp tubes. The fixtures come with sheet aluminum reflector mounted between the lamp and ballast housing.

The relamping end is supplied with a toggle arrangement, permitting it to be dropped down sufficiently to clear an adjacent fixture. Fixture is relamped by removing the end fitting cover and releasing the lamp by means of a bayonet joint plate on which the socket is mounted.

Standard fixtures are arranged for ordinary vertical mounting but an attachment is available for mounting at an angle of 45° either side of vertical.



Indirect Luminaires

(2) Day-Brite Lighting Inc., 5409 Bulwer Ave., St. Louis 7, Mo.

Developed by engineers at MIT taking their initials to form its name, PBM, a new fully enclosed luminous indirect fixture is claimed to reduce maintenance to a minimum. Construction and simplicity of parts make the fixture easy to install as a unit or in a continuous row, according to the manufacturer. It is available for two 40-w F lamps, two 40-w Slimline lamps, two 60-w Slimlines; is Underwriters' approved.

The wireway can be surface mounted to ceiling or recessed up to edge of cover. Adjustable hangers allow hand-operated alignment of fixtures after installation. Top sections of ends and couplings are hinged to allow removal of top plastic for relamping.

Load Pickup Sectionalizer

(3) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

A load pickup sectionalizer, type LPS, is used in connection with reclosing circuit breakers or reclosers and enables distribution circuits to be picked up after long power outages without manual operations.

It compensates automatically for the power demand that accumulates during an outage and, if the accumulation is enough to cause reclosing circuit breakers to operate, the LPS sectionalizer will disconnect part of the load temporarily. The load is reconnected after a predetermined time delay by a self-contained timing relay. The time delay is a function of the outage duration but has an adjustable maximum value.

Under fault conditions, the sectionalizer operates as a conventional automatic line sectionalizer. It can serve also as a manual load-break switch.

The unit is contained in a galvanized steel tank with a cast-iron cover casting that supports 15-kv line bushings. The series coils come in ratings from 5 to 100 amp; control relay voltage in either 110 or 220 v a-c. Additional details available from the manufacturer.

Plastic Tape

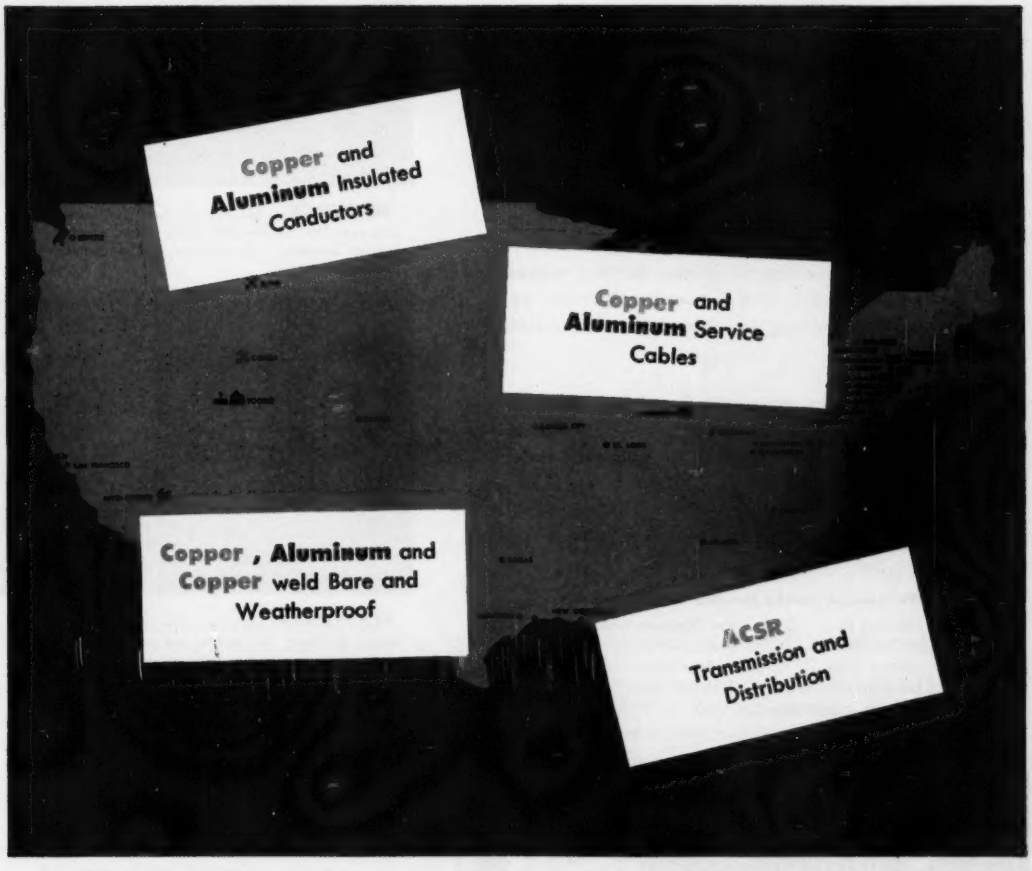
(4) Okonite Co., Tape Department, Passaic, N. J.

Panther plastic electrical tape can be used for both electrical and mechanical purposes. It is 7 mils thick, will withstand 10,000 v and has an insulation resistance of more than 1,000,000 megohms per 10 sq in. of tape; it will stand 20 lb pull per inch of width without breaking and can be stretched readily to permit smooth wrapping; it adheres to any dry surface even at low temperatures, resists water, oils, chemicals and withstands weather extremes. Available to wholesaler distributors in standard rolls packed in individual cans, five-roll service packs or counter display units, it carries UL approval and complies with established government and commercial specifications, the manufacturer states.

(5) For use where color register is important, unit uses fluorescent tubes in a patented fixture to give an effect equivalent to daylight. Blue, red and white Slimline lamps are combined to give a white light of approximately 6,000 K color temperature. Called Spectro-Lite, fixture comes in 18-, 36- and 96-in. lengths; by John P. Filbert Co. Inc., 2007 S. Vermont Ave., Los Angeles

first in electrical conductors

Anaconda experience in designing, manufacturing and engineering electrical conductors for every type of power distribution system is nearly as old as the power industry itself—well over half a century.


Copper and Aluminum Insulated Conductors
Copper and Aluminum Service Cables
Copper, Aluminum and Copper weld Bare and Weatherproof
ACSR Transmission and Distribution

ANACONDA wire and cable company, 25 BROADWAY, NEW YORK 4, NEW YORK

Gruelling tests prove that

Rome • EMT is welded

The accompanying unretouched photographs show the results of the most punishing tests ever inflicted upon an electrical metallic tubing. Note that Rome • EMT has been compressed, flattened, flared and expanded—*yet the weld holds as firm as the metal itself* . . . further proof of the superior quality of this lightweight steel raceway.

Such "built-in" precision welding is only one of many important structural advantages you get with Rome • EMT. Light in weight and easy to bend, it assures fast, economical installation. Simple compression type fittings eliminate thread cutting and permit rapid, moisture-tight connections. A mirror-smooth interior surface makes wire pulling easy. And its electrogalvanized exterior affords utmost protection against corrosion and abrasion.

Underwriters' approved, Rome • EMT exceeds all standards for thin wall raceways. Ample stocks are now available in the following sizes:

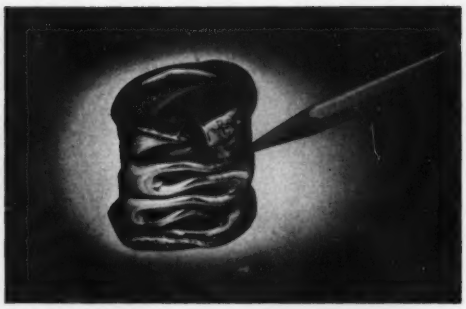
STRAIGHT LENGTHS—½", ¾", 1", 1¼", 1½" and 2".

90° ELBOWS—¾", 1", 1¼", 1½" and 2".

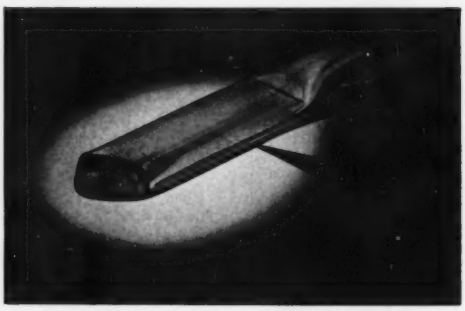
Warehouse stocks located as follows:

Chicago, Ill.	San Francisco, Calif.
Dallas, Texas	Seattle, Wash.
Denver, Colo.	St. Paul, Minn.
Los Angeles, Calif.	Torrance, Calif.

Salt Lake City, Utah



SQUEEZED like an accordion by tons of pressure—yet the Rome • EMT weld holds firm . . . proving the weld to be as strong as the tube walls themselves.



FLATTENED like a pancake—actually creased along the weld. But look at the weld itself. It remains unbroken and as good as ever.

ROME CABLE
Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

ROME CABLE ROME, N.Y.

It Costs Less to Buy the Best

WESTERN SALES OFFICES AND WAREHOUSES

SALT LAKE CITY 1, UTAH
230 South 4th West St.

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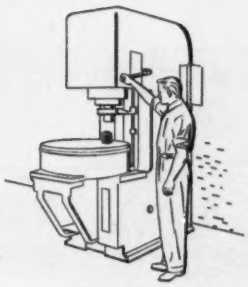
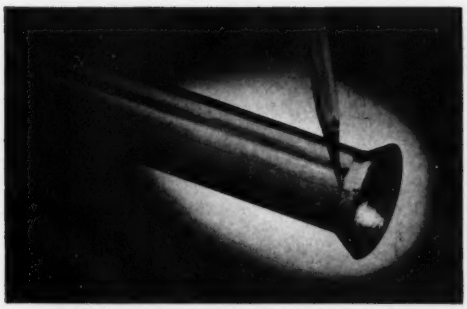
SEATTLE 4, WASH.
3404 Fourth Ave., So.

DENVER 3, COLO.
1160 Elati St.

Forever!





FLARED while cold during a cone test. And note the weld. There's not a single indication of a break.

EXPANDED 25% and flared. If weld weakness existed, this test would surely find it. Yet look at it —strong as ever . . . proof positive of Rome • EMT's superiority.

The Rome • EMT used in these tests is 1" in diameter, .049" in wall thickness.

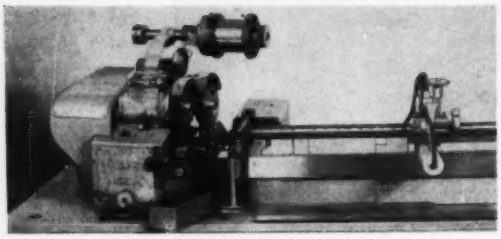
For unexcelled wire and cable performance:

ReFlex ReMarine ReBarn RePrene®
ReZone® Rome Synthinel® ReLene

Test it yourself!

Get a Free Sample of Rome • EMT

Rome is anxious for you to actually see EMT—to feel its light weight, its mirror-smooth surface—to test its weld yourself . . . and compare it with any other lightweight metallic conduit on the market today. For your free sample, please write us on your company letterhead. Address Rome Cable Corporation, Rome, N. Y.

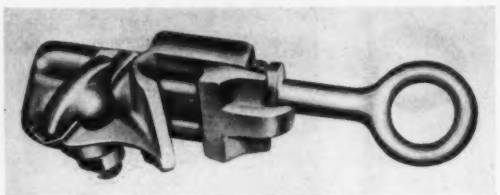


Wire Coiling Machine

(6) Driver-Harris Co., Harrison, N. J.

This new coiling machine features synchronized rolling action of all coiling parts. According to the manufacturer, different sizes of wire can be coiled with maximum uniformity without the wire being scored or misshapen; precision of the photoelectric cell cutting knife control assures exact lengths; coils produced meet resistance specifications with exceptional fidelity.

The machine consists of four subassemblies: coiling head, comprising motor drive, speed control and coiling mechanism; cutting knife; horizontal coil-length control; electronic knife control. It is said to handle the full range of resistance wire coiling normally required, close or open winding, and can be adapted for twin-wire coiling; to produce coils that stretch evenly; to cut coil ends clean on all sizes, close or open wound; to maintain resistance accuracy of cut coils at all times by photoelectric control. The standard model coils No. 20 to No. 36 B&S-gage wire. Units for other gages can be supplied to order. Bulletin C-52 gives details.



Hot-Line Clamp

(7) A. B. Chance Co., Centralia, Mo.

A protected-connection hot-line clamp comes in a complete range of sizes. Threads are enclosed in a corrosion-proof lubriplate housing to prevent freezing on the line. Threads and eyes screw shaft are further protected from arcing by recessing the shaft to keep it out of the arc zone. Wide v-shaped contact jaws are designed to contact all strands and are said to increase conductivity, improve current distribution, reduce heating and current loss and help to reduce radio and TV trouble.

The design balances the jumper connection with the eye screw, reducing conductor fatigue. Bell-shaped jaws prevent sharp bending of conductor. A shielded spring compensates for conductor flow and prevents line vibration from shaking clamp loose.

For Additional Information
Fill in the Coupon on Page 76

Chemical Stabilizer for Synthetic Rubber

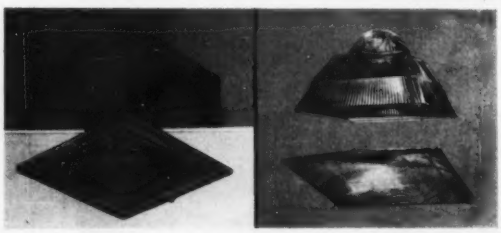
(8) United States Rubber Co., Naugatuck Chemical Division, Rockefeller Center, New York 20, N. Y.

Polygard, a new chemical designed to produce GR-S rubber that is nondiscoloring and nonstaining, will find uses in wire insulation. Known chemically as an alkylated aryl phosphate, it is claimed to give rubber good heat stability and to guard it from the destructive effects of heat and oxygen during storage and processing. It is incorporated with the rubber as an emulsion during the production process; is blended with GR-S during its liquid or latex form; can be used with rubber produced by either the hot or cold process and is adaptable to use with the newer types of oil-extended rubbers.

Electrical Tape

(9) Van Cleef Bros. Inc., Division of Johns-Manville Corp., 7800 Woodlawn Ave., Chicago 19, Ill.

Designed for heavy-duty work, winding heavy cables, electrical harnesses and for use with power-driven taping machines, this new tape is .010 in. thick, is claimed to have great strength and flexibility and to be resistant to weather, oils, acids, alkalies and corrosive chemicals. Dielectric strength averages 10,000 v. Ability to stretch makes it conform well to irregular surfaces, the manufacturer states.



Luminaire

(10) Holophane Co. Inc., 342 Madison Ave., New York 17, N. Y.

A low-brightness recessed luminaire, claimed to have increased efficiency, features a larger lens and narrower trim. The "optical train" consists of a square prismatic reflector and a concave Controlens. High brightness is on the near side of the lens and shielded from the observer at normal viewing angles. The shape is also said to facilitate better transmission of both direct and reflected light. Designated F-1570, the unit is shown in the illustration with the reflector and Controlens.

Rubber-Phenolic Varnish

(11) General Electric Co., Chemical Division, Pittsfield, Mass.

Development of a rubber-phenolic varnish that permits manufacture of laminated plastics having two to three times the impact strength of those made with conventional varnishes has been announced. This No. 12359 varnish was formulated for tough mechanical applications such as gears, shuttles, tubing and castor wheels.

INCREASE REVENUE

by economically serving more customers

and SAVE COPPER

№ 8 Copperweld CONDUCTORS

SAVE YOU NEARLY 700 LBS. OF COPPER PER MILE OF SINGLE-PHASE LINE

No. 8 Copperweld* Conductors will help you build economical tap lines in low-density areas. By using these low-cost Copperweld Conductors, which provide plenty of conductance and strength for primary taps, many companies have found that they can profitably take on more customers in outlying communities—and conserve on the use of critical materials as well. For example, on a single-phase line serving small groups of customers, a No. 8 Copperweld Conductor can be used in place of No. 6 Awg copper, the usual minimum size of copper wire used for overhead construction, with a copper saving of nearly 700 pounds per mile.

The protected steel core of Copperweld Wire assures permanent high strength. This results in safer and longer spans with less maintenance expense. What's more, construction costs are greatly reduced because fewer poles, accessories and man-hours are required.

Reach out for increased revenue by installing No. 8 Copperweld Conductors on your rural tap lines. For heavier electrical loads and longer spans, No. 6 Copperweld Conductors offer similar advantages. Write today for complete engineering data, including sag and tension charts.

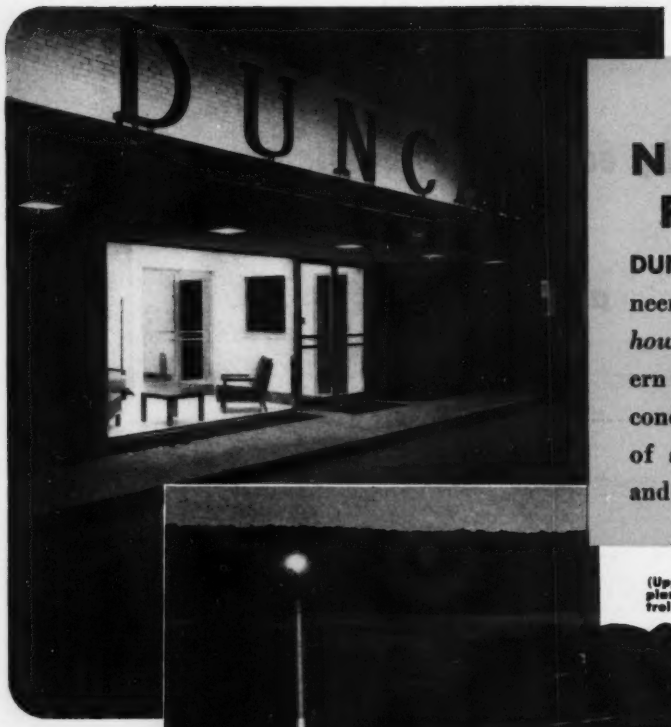
*Trade Mark

COPPERWELD STEEL COMPANY

Glassport, Pa.

Pacific Coast Office Monadnock Bldg., San Francisco

RURAL CONDUCTORS



To serve you

NEW PLANT FACILITIES

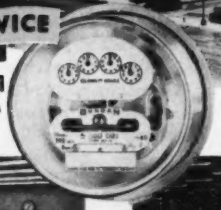
DUNCAN'S fifty years of engineering and production *know how*—now operating in modern facilities, under controlled conditions—is your guarantee of sound watthour meters and metering equipment.

(Upper left) Main entrance to the new Duncan plant . . . completely air-conditioned . . . controlled humidity. Construction by The Austin Co.

DUNC

1901 FIFTY YEARS OF SERVICE 1951

Watthour Meters • Demand Meters • Sockets
Heavy Duty Mounting Devices
Instrument Transformers

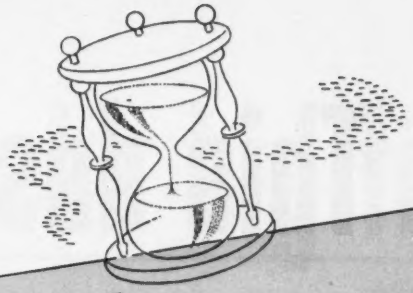


(Above) New Duncan plant . . . Aerial view looking toward Wabash Valley.

Engineering and drafting facilities . . . constantly working to meet industry requirements.

Manufacturing Area . . . high level of illumination . . . precision equipment . . . cleanliness a must

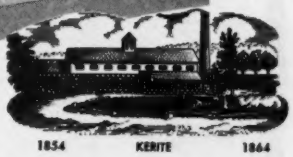
DUNCAN ELECTRIC MFG. CO. LAFAYETTE, INDIANA



KERITE
CABLE-GRAM

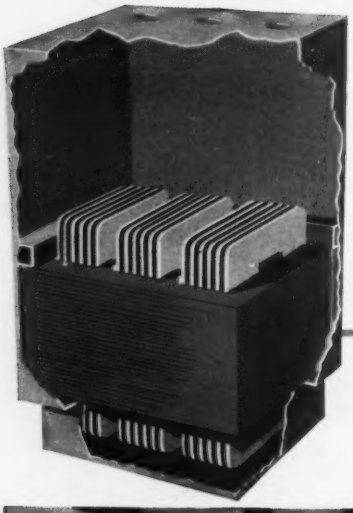
TIME IS THE MEASURE OF ALL THINGS. FEW OF MAN'S INVENTIONS CAN STAND ITS MERCILESS JUDGEMENT. YET KERITE FOR OVER 90 YEARS HAS THRIVED AND SPREAD AND GAINED THE CONFIDENCE OF THE USERS. TIME, INDEED, GIVES KERITE ITS UNQUALIFIED RECOMMENDATION.

THE VALUE AND SERVICE LIFE OF A PRODUCT CAN BE NO GREATER THAN THE INTEGRITY AND CRAFTSMANSHIP OF ITS MAKER.

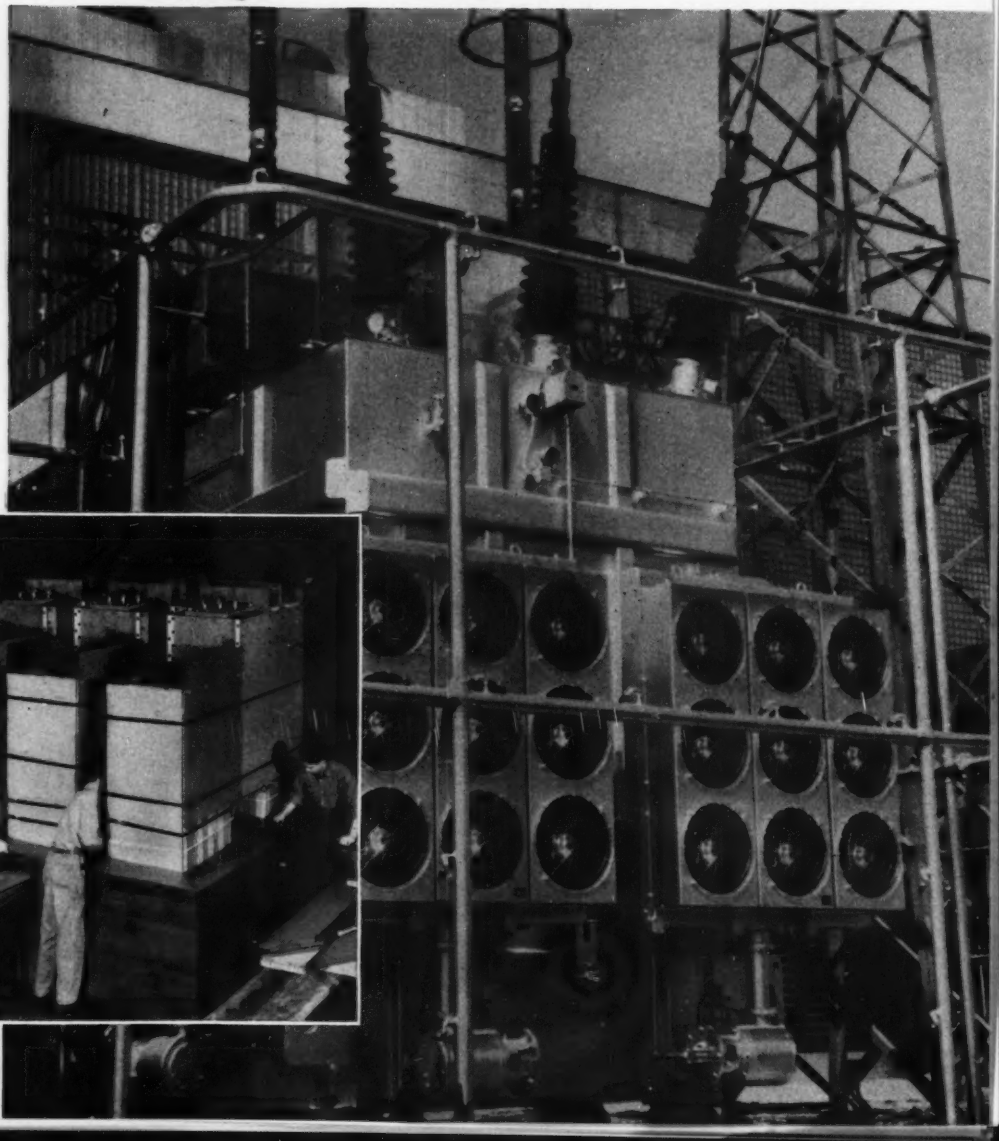


KERITE CABLE

THE KERITE COMPANY—30 Church St., New York 7, N. Y.
Offices also at 122 Michigan Ave., Chicago; 582 Market St., San Francisco;
3901 San Fernando Rd., Glendale 4, Calif.



This design



knocks big figures off installation cost

When you figure *installed cost,* a Westinghouse Form-Fit Power Transformer shows substantial capital savings.

It's easier for your crews to handle; get on the line faster. Over-all dimensions are considerably smaller than comparable ratings in other designs. Weight is correspondingly lower, too. This leads to worth-while savings in both foundation and overhead structures.

The Form-Fit case clamps the core, and the core, in turn, surrounds, supports and protects the coils. This compact and sturdy construction permits a transformer to be transported to your site on its side when shipping clearances would otherwise require disassembly. Or it may be tilted at any angle to facilitate installation. This rugged construction means less danger of damage through accidental mishandling; gives added assurance that the quality built into the transformer will reach your site intact.

When you need greater transformer capacity installed on schedule at lowest capital cost, check Westinghouse Form-Fit Power Transformers. Your Westinghouse representative will be glad to give you further information, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-70626

147,500 kva
3-phase 60 cycle FOA
161 kv to 17 kv

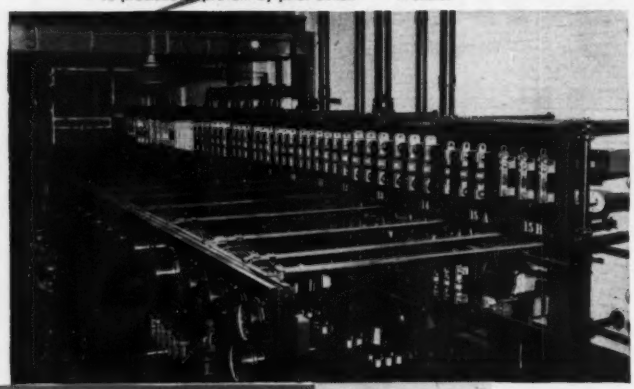
YOU CAN BE SURE...IF IT'S
Westinghouse
POWER TRANSFORMERS

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

Anticipate* Destruction

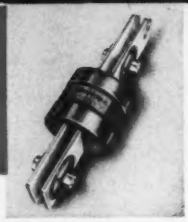
Amp-trap PREVENTS DEVELOPMENT OF HEAVY SHORT CIRCUIT CURRENTS

* To preclude or prevent by prior action — Webster



SHAWMUT Amp-trap*

"T.M. REG. U.S. PAT. OFFICE"



Amp-trap installation at Bird & Son, E. Walpole, Mass., raised the interrupting capacity of the system from 20,000 amperes to 100,000 amperes R.M.S. at 600 Volts, 60 Cycles.

NEW, LOW-COST SHORT CIRCUIT PROTECTION

Amp-trap, with its 100,000 RMS Interrupting Capacity, opens the circuit so fast that it *precludes* the development of the peak available short circuit current. Consequently, it *prevents* both magnetic and thermal destruction. Even phase-to-ground faults are cleared so quickly that multi-conductor faults are usually avoided.

CERTIFIED AND APPROVED

Amp-trap is listed by Underwriters Laboratories. Interrupting tests up to 202,000 amps at 500v 60 cycles have been witnessed and certified by Electrical Testing Laboratories, Inc. Amp-trap is favored by many insurance companies.

FOR SYSTEMS OLD OR NEW

Amp-trap is supplied in all standard ratings up to 4000 amperes for application on any circuit up to 600 volts AC or DC. It can be used on either old or new switchgear with a minimum of structural rearrangement. "Outage" time for installation is negligible. There is no better way to insure your investment in switchgear, bus-ducts, motor starters, circuit breakers and current transformers. Every service entrance on a network system needs Amp-trap protection. The list of Amp-trap users reads like the Blue Book of American industry. Investigate now.

"You Can Get Amp-traps"

WRITE FOR FREE AMP-TRAP BULLETIN TODAY.

AMP-TRAPS — *"Awake At The Switch"*

THE CHASE-SHAWMUT CO.

385 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS

Panelboard

(12) BullDog Electric Products Co., Detroit 32, Mich.

The PB Electri-Center is a general-purpose circuit breaker panelboard for controlling lighting and appliance circuits; is rated one phase, three wire, solid neutral, 120/208 v a-c with 100-amp main wire grips or three phase, four wire, solid neutral, 120/208 v a-c with 100 amp main wire grips. Underwriters' lists it as an inspected panelboard.

These panelboards come in two sizes, 14 or 20 circuits; are merchandised to distributors as basic devices. The basic device contains box, interior, two 15-amp Pushmatic breakers and two 20-amp Pushmatic breakers. Additional breakers, filler plates and fronts are supplied at time of purchase to suit specific needs. Doors with locks are available if desired.

Connector

(13) Rodale Mfg. Co. Inc., Department EW, Emmaus, Pa.

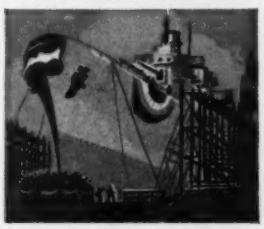
An unbreakable, shock-proof 2-wire soft-rubber-cord connector body designed for heavy-duty industrial service was added to the Turn-Tyte line. It has a metal cord clamp and is interchangeable with other makes of interlocking devices. It is UL listed, has all-steel parts coated to resist corrosion; is rated 10 amp, 250 v and 15 amp, 125 v. Cord hole diameter is 0.156 to 0.650 and the connector has an outside diameter of 1½ in. Designated catalog No. 2109.

A DEPENDABLE SIGN...

that America is expanding

Thanks in great part to you who harness electricity, America is expanding rapidly in the face of world tension.

As America strengthens its defenses, the YELLOW TRIANGLE REEL and the stack of Triangle conduit become more and more familiar sights. Engineers and contractors—demanding quality wire, cable and conduit—know that ***YOU CAN DEPEND ON TRIANGLE and on the ELECTRICAL DISTRIBUTOR.***



The Trade-Mark
of Top Quality

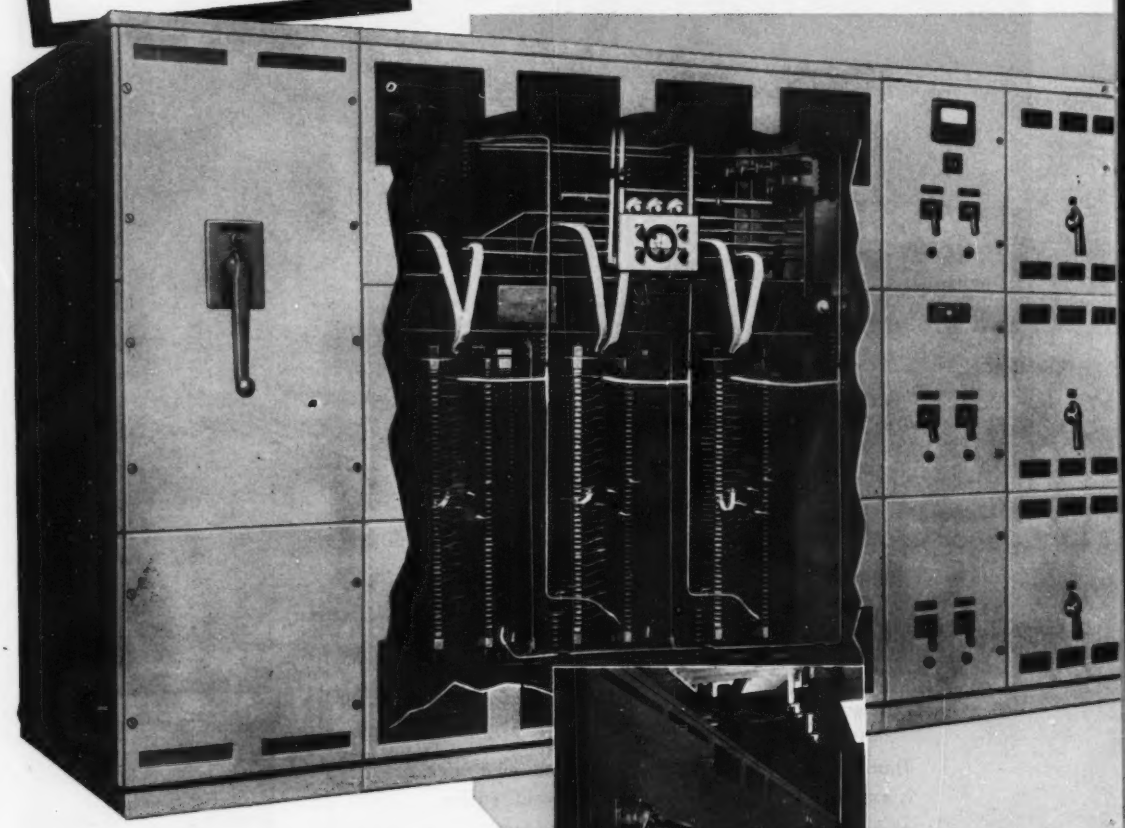
TRIANGLE CONDUIT & CABLE CO., INC.
NEW BRUNSWICK, NEW JERSEY

IT MUST BE RIGHT

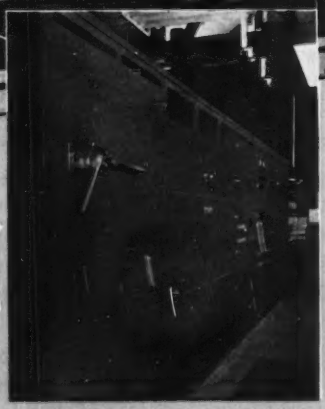
"Glazon" Building Wire · "Glazon" Non-Metallic Sheathed Cable · Control Wire · Armored Cable · Service Entrance, Service Drop, Varnished Cambric Braided or Leaded, Trioprene Trench, Power & Parkway Cables · Bare Wire · Rigid Conduit Hot-Dipped Galvanized & Black Enameled · Electric Metallic Thin Wall Conduit · Flexible Steel Conduit.

Wagner

TRANSFORMERS
... the choice of leaders in industry



This metal clad switchgear with 500 kva Wagner three-phase dry-type transformer is one of seven load centers serving both light and power for office and manufacturing at an Eastern Electronics plant.



WAGNER ELECTRIC CORPORATION
6381 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

Wagner Electric Corporation
EST. 1891

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always specify **Wagner**

UNIT SUBSTATION TRANSFORMERS

for dependable load-center power distribution

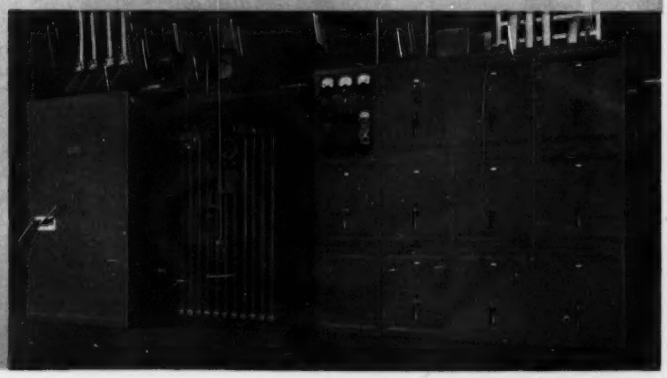
The importance of the transformers in your plant power distribution system cannot be over-emphasized. If a switch or a circuit breaker fails, only a part of the system is affected—but if the *transformer* fails, the entire system is dead.

Wagner Unit Substation Transformers, both dry-type and liquid-filled, assure a continuous, dependable flow of power. They are carefully designed to meet your distribution requirements.

Wagner three-phase dry-type load-center transformers are built in ratings through 2000 kva in the 15-kv class and below. Transformer and incoming line section are housed in compact factory-matched enclosures, designed for direct connection to matching secondary switchgear to form a closely coupled unit substation that is streamlined in appearance and affords ready accessibility. Complete enclosure of all equipment assures safety against contact with live parts.

Wagner Dry-Type Unit Substation Transformers are for indoor installation in dry, clean, well ventilated locations. Because of their relatively light weight they can be used in multi-story buildings. Wagner Liquid-Filled Unit Substation Transformers are available for indoor or outdoor installation.

Bulletins TU-56 and TU-13 give full information on Wagner Dry-Type and Liquid-Filled Substation Transformers. Write for your copies. Wagner-trained field engineers will be glad to help you solve your load-center problems. Consult the nearest of our 32 Branch offices. There's no obligation.

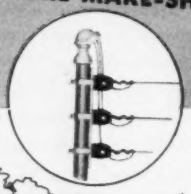


Oil filled and non-inflammable liquid-filled (Noflamoil) transformers are available with various types of entrances and controls for high-voltage circuits, and with throats on the secondary side, in ratings up to 2000 kva.

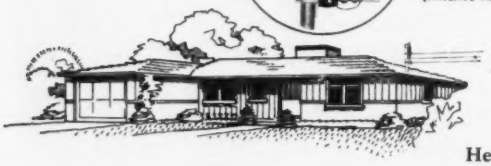
It's new!

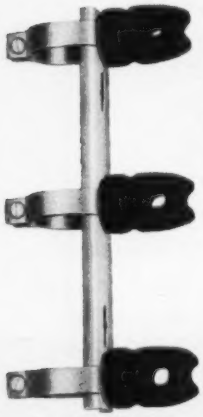
PIPE MOUNTING HOUSE BRACKETS

NO MORE FUSSING OR FUMING
NO MORE MAKE-SHIFT ARRANGEMENTS



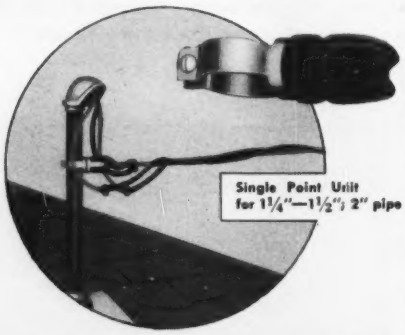
(PATENTS APPLIED FOR)





Three Point Unit 4½" or 6" wire spacing, for 2" and 2½" pipe

Here's just what you've wanted all along. Porcelain Products offers you the *first* easily attached, low priced Pipe Mounting House Bracket for use wherever you fasten electrical conductors to pipe. They're perfect for residential, industrial or rural wiring jobs... ideal for ranch type housing with wide eaves. Save time.. money.. avoid costly delays. Write for prices, literature.



Single Point Unit for 1¼"—1½", 2" pipe

PP INC.

Porcelain Products, Inc.
FINDLAY, OHIO

Rubber Mat With Heating Unit

(14) United States Rubber Co., Rockefeller Center, New York 20, N. Y.

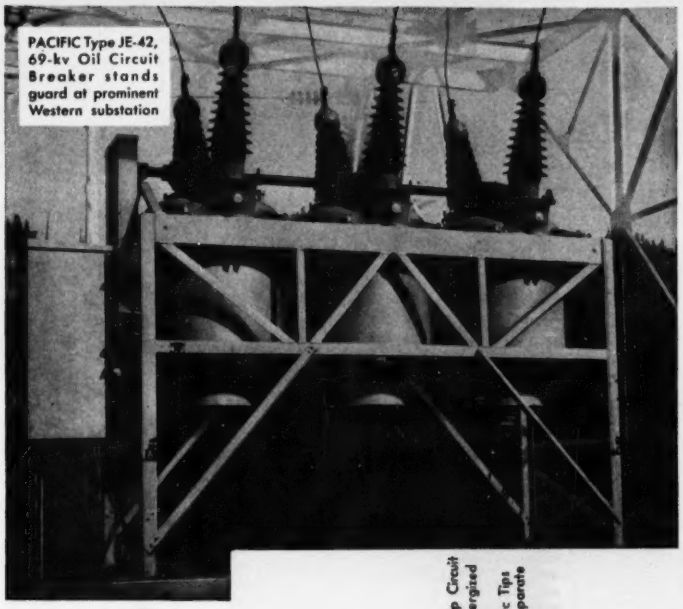
A rubber mat with built-in radiant heating unit has been tested in theaters, hotels, warehouses and in unheated or refrigerated areas of industrial plants. On the surface, the heater looks like a rubber floor mat, but its center contains a layer of electrically conductive rubber. The heater operates on 110 v. Normal operating temperature is about 35° above the surrounding temperature. The mat is marketed under the trade name Uskon; is manufactured in the company's Passaic, N. J., plant.

(15) **PLASTIC MATERIAL**—A new material with approximately 1/6th the weight of stainless steel and claimed to have much greater corrosion resistance has been announced by Bolta Products Inc. of Lawrence, Mass. Called Boltaron 6200, the material is a rigid nonplasticized polyvinyl chloride of high molecular weight. Among suggested uses are wire insulations, fan housings and electrical conduits.

(16) **TEMPERATURE CONTROL**—The Firelator electron-mechanical automatic temperature control unit comes in three standard ranges up to 2,250 F and one special range to 3,000 F. Automatic limit and temperature maintenance control are combined in one portable unit. It operates as a plug-in unit and may be used to control any electrical furnace, the manufacturer states. It will operate from 70 to 140 v a-c without adjustment. Made by the Lawrence Instrument Co., 4903 12th Ave., Brooklyn 19, N. Y.

(17) **CIRCUIT TESTER**—A pocket-sized circuit tester is designed to test shorts and grounds on appliances or lines from 90 to 550 v a-c, d-c. It operates on the neon glow lamp principle, comes complete with two test prods connected to the lamp in series. Called Dandy-Lite, it is made by Neo-Lite Mfg. Co., 915 Taylor Ave., Rockford, Ill.

Advanced 69-kv Protection ...Blade-Travel Chart Shows Why



PACIFIC Type JE-42, 69-kv Oil Circuit Breaker stands guard at prominent Western substation

PACIFIC ELECTRIC

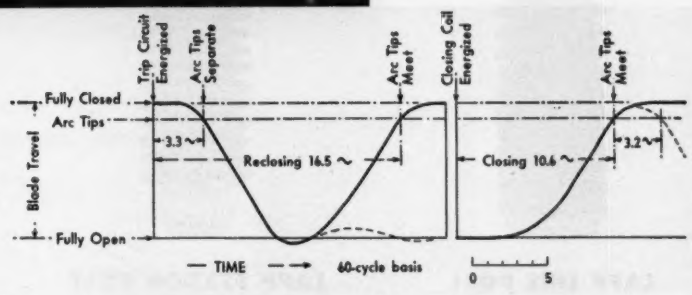
Type JE-42
Frame-Mounted

CIRCUIT BREAKERS

ELECTRICALLY and MECHANICALLY TRIP-FREE IN ANY POSITION

NEMA and ASA STANDARD

69 kv	Continuous	Interrupting
	600 amp	1,000,000 kva
(Also other styles 7.5 to 230 kv)	1200 amp	1,500,000 kva
	1200 amp	2,500,000 kva



At right: **Blade-Travel Diagram (tanks filled with oil)**

Open and immediate reclose shown at left of chart. Note full opening. Normal close shown at right. Dotted alternate shows start of opening after closing against fault.

THE APPLICATION Engineer needs only to glance at the blade-travel chart of the Pacific Type JE-42 to know that here is something special and out of the ordinary in 69-kv breakers.

The fast opening and reclosing holds system disturbance to a minimum in the case of both transient and permanent faults, and the fact that reclosing is from fully open position assures no impairment of insulation during the critical surge time that follows an interruption caused by repetitive lightning.

The short normal closing time as well as the reclosing time is maintained constant regardless of variation or loss of control voltage. Consequently when closing against fault there can be no slow drift-in of blades which might result in electromagnetic blow-back of blades far enough to open the a-auxiliary switch in the tripping circuit before the relays can operate. Simmering arcs are thereby avoided.

The interior construction also exhibits other advanced features that contribute to reliability of operation, as well as to ease of adjustment and low maintenance cost. Catalog 550 tells about them.

Since 1906

SALES OFFICES or AGENCIES in PRINCIPAL CITIES

PACIFIC ELECTRIC MFG. CORPORATION

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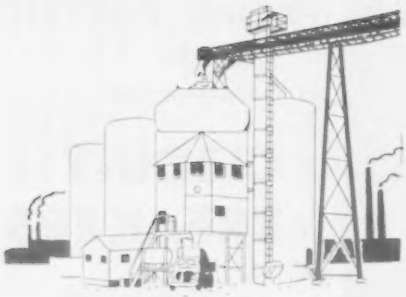


PROBLEM:

Industrial Contamination

LAPP LINE POST

"All-time champion" among transmission insulators in point of service dependability at duty up to 69 kv. Its record, both on new construction and after reinsulation of lines to higher voltages, has been built on ability of Line Post to avoid leakage flashover, to withstand lightning arcover and mechanical attack, its inherent freedom from puncture and cracking.

LAPP STATION POST

In addition to the superior electrical and mechanical characteristics inherent in Lapp Post design, Station Posts also possess extra rigidity. Cap and base are externally attached for large-area low-intensity compression loading of porcelain, as contrasted to small-area, high-intensity loading of nested porcelain and metal parts in conventional pin-cap switch insulators.

LAPP FOG-TYPE SUSPENSION INSULATOR

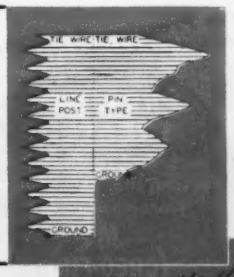
For high-voltage lines in areas of severe contamination—salt fog, industrial fumes, or dust—Lapp Fog-Type suspension units provide maximum leakage distance per length of string—and for greater effectiveness of leakage distance, inch for inch.

SOLUTION: Lapp Fog-Type Design

Service dependability on lines subjected to severe contamination . . . industrial smoke and fumes, dust, or salt fog . . . can be assured—without frequent cleaning of insulators—and without danger of failure from leakage flashover. Lapp Fog-Type design provides superior performance for transmission, switch and bus support because of two basic superiorities of design principle . . .

1. UNIFORM LEAKAGE PATH

Leakage flashover results from a contaminated surface which is not uniform—wet areas lower total resistance, so increase leakage current until voltage flashes over narrow shielded areas, precipitating flashover of entire unit. Compare developed uniform leakage surfaces of 66 kv Line Post (on left side) with that of conventional pin-type (right) where variation in conductivity is 3.6 times as great.



2. SELF-CLEANING

Under heavy rain and wind, contamination rapidly flushes away. Fog-Type petticoats are so shaped and spaced that rain falling on one petticoat splashes and cleans the under side of the one above. Resistance increases, leakage current falls—uniformly and over entire unit.

Lapp

LAPP INSULATOR COMPANY, INC., LE ROY, NEW YORK

Lapp Insulator Co. Inc. Leroy, N.Y.
UNITED STATES RUBBER COMPANY US TRADE MARK
BURNDY Engineering Co. Inc.
EARL S. Condon COMPANY
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PRospect 8375
CARMA MFG. CO.
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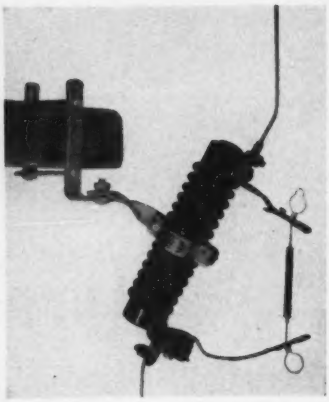
PLP

There's Longer Life in Pressure-Creosoted POLES by McCORMICK & BAXTER
PRESSURE TREATED with Coal Tar Creosote for Long Life, Dependable, Economical Service
M CREO-FIR B
Straight, Strong Durable
OREGON DOUGLAS FIR
Poles • Piling • Lumber • Ties • Crossarms
• Machine Peeled
• Full-length Pressure Treatment
• Manufactured Uniformity
• Immediate Delivery
McCORMICK & BAXTER CREOSOTING CO.
PORTLAND — Board of Trade Building • ATwater 2346
SAN FRANCISCO — 485 California St. • DOuglas 26771
LOS ANGELES — 6214 W. Manchester Ave • ORegon 8-3726
Treating Plants. PORTLAND, ORE. • STOCKTON, CALIF.



Cutout

(18) W. N. Matthews Corp., 3850 Delor St., St. Louis 16, Mo.

Horizontal position of the coil spring in the lower contact arm of this new Protectolink cutout allows each individual coil to flex and is claimed to give greater operating assurance under heavy icing conditions.

Metal parts have been eliminated from the back of the insulator at the upper end to prevent birds and animals from shorting out the device. Terminal leads make direct contact to upper and lower contact arms, which provides for cool operation. The cutouts are available in 50-amp, 7.5- and 15-kv ratings, catalogs 1640-SA and 1641-SA respectively.

Fuses

(19) Monarch Fuse Co. Ltd., Jamestown, N. Y.

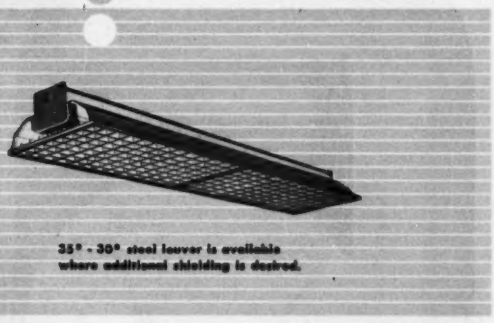
Heat dissipating fins have been added as a design feature on some of the manufacturer's line of renewable knife-blade-type fuses. Six large area, brass fins are incorporated, three spaced equally along each end of the fiber bar supports. It is claimed that the interior of the fuse remains cooler, that heat is kept away from the fiber bar and that support is given to the fiber bar. The 600-amp, 250-v and 400- and 600-amp, 600-v fuses have the new design. Details in bulletin 25.

(20) **RESISTORS**—Miniature power-type resistors with axial leads, trade named Axiohm, have been developed by Ward Leonard Electric Co., Mount Vernon, N. Y. They are for use in radio, electronic and other equipment, where space saving and minimum assembly costs are important.

For more data fill in coupon, page 76

NOW! All-Brite U.C.* brings quality lighting to industrial installations!

photometrically engineered slotted-reflector directs correct proportion of light to ceiling, eliminating light-against-dark brightness contrasts



35° - 30° steel louver is available where additional shielding is desired.

SLIDING HANGER BRACKETS
Adjustable brackets permit stem or rod mounting.

JOINER CHANNEL
Provides perfect alignment of fixtures in continuous runs.

CHAIN SUSPENSION
Chains hook into holes in end plates.

more than 33 miles of U.C. lighting now being installed by **CONVAIR** *in the greatest Western illumination job of all time*

The huge new Convair plant in California will utilize more than 20,000 All-Brite industrial U.C. fixtures to illuminate production facilities. The All-Brite Industrialist with Upward Component was thoroly checked for this great project and fulfilled every expectation.

* INDUSTRIALIST with UPWARD COMPONENT

This great All-Brite slimline industrial luminaire ushers in a new era of illumination for the modern plant! A balanced distribution of light on working surfaces, and on ceiling, relieves eyestrain and fatigue, promotes safety and employee morale, increases production, facilitates control, cuts down rejects. Manufactured of quality materials; finished in All-Brite Formula 44X high-reflectance white baked enamel (or in porcelain); easy to install, clean and relamp. Lighting fixtures are important tools of industry — investigate this superior unit for your needs.

All-Brite

leading western line of fluorescent and slimline luminaires

FLUORESCENT FIXTURES OF CALIFORNIA

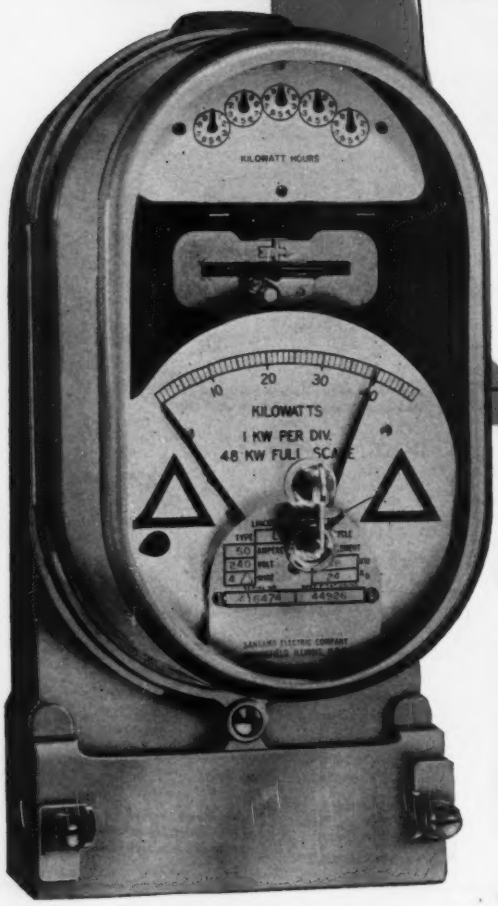
san francisco: 3320-18TH STREET

los angeles: 613 IMPERIAL STREET

portland: 1318 S. W. FIRST AVENUE

NEW...

SANGAMO Polyphase Combination Watthour and Demand Meters



TYPE LWP

...for convenient, dependable demand measurement on all polyphase circuits!

The Type LW line of combination watthour thermal demand meters combines a completely standard Sangamo Type LC polyphase watthour meter with a fully shielded Lincoln Type WD watt demand meter of the latest design, having excellent inherent characteristics under widely varying ambient temperature conditions. As in other Lincoln combinations, *no sacrifice* has been made of the established characteristics of either the watthour meter or of the demand meter, since they operate entirely independently of one another.

Types LWP and LWS

Both the Types LWP and LWS meters are supplied in 2-element form for 3-phase, 3-wire; 3-phase, 4-wire Delta; and 3-phase, 4-wire Y. The bottom-connected Type LW is supplied with the conventional polyphase terminal block providing for a maximum of 8 current and 7 potential terminals. The socket Type LW can be furnished either with a 5 terminal base for *network* 3-wire metering, or with as many as 10 terminals for regular polyphase connection.

SANGAMO

SM.52-6

TYPE LWS

The efficient Lincoln thermal actuating element functions entirely independently of the watthour meter. Lincoln demand meters contain only one element that moves, and that moves very slowly. It consists of a center shaft on which are mounted the indicating pointer and two equal and opposing coiled bimetal strips. These bimetal coils are thoroughly aged under conditions much more severe than full scale operation and are also very accurately paired for balance under wide temperature variations.

Only Measured Facts are Known Facts

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

Strain Clamps

(21) Porcelain Insulator Corp., Lima, N. Y.

Three new strain clamps are designed for use with either ACSR or all-aluminum conductors. The 4550 will accommodate all-aluminum conductors and ACSR from .2 to .55, including No. 4 through No. 1/0 ACSR or all aluminum. The 4468 is recommended by the manufacturer for use with 2/0 through 4/0 ACSR or all-aluminum conductors ranging from .2 to .68. The 4485 is for use on 226,-800, 300,000 and 336,400 cir mils ACSR or all aluminum. All three may be used for smaller conductors where a wide range is desired and are furnished with liners if required.

These clamps are claimed to be easy to blanket when lines are worked hot and to provide excellent snubbing action without damage to conductors. They have come-along eyes to facilitate installation. Quadrant-type design allows continuous running of conductor and eliminates necessity of cutting conductor at strain points to make jumper loops, the manufacturer states.

(22) **SPOTLIGHT**—An all-angle spotlight, the Focalite, can be used in window displays, shadow boxes, show cases and other applications. It is made of one-piece aluminum with satin finish; rests on a flocked tripod base. It is designed for a PAR 38 spot, flood or colorbeam reflector lamp and comes with a 6-ft cord and plug. Product of Amplex Corp., Department FP, 111 Water St., Brooklyn 1, N.Y.

(23) **WALL PLATE**—The Uniline wall plate is designed for every type of installation, according to its manufacturer, the Arrow-Hart & Hegeman Electric Co., 103 Hawthorn St., Hartford 6, Conn. Units accommodate single, duplex and multiple wiring devices of both regular and interchangeable-line types. They come in brown or ivory.

(24) **KITS** — Complete sets of normal wearing parts for Life-Linestarters are offered by Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

Leveling Device for Luminaires

(25) Hubbard Aluminum Products Co., Division of Hubbard & Co., Pittsburgh, Pa.

The Levelite, produced in malleable iron by the parent company for several years, is now being made in aluminum alloy by Hapco. It is a ball-and-socket connection designed to make a quick adjustment of the luminaire to a level and plumb position after installation. Features are simple setting and versatile adjustment, according to the manufacturer. The aluminum alloy Levelite will match the line of Hapco aluminum alloy street lighting standards and brackets.

Mounting Straps

(26) Pryne & Co., Pomona, Calif.

The Redi-Set mounting strap for use with Pry-Lite recessed lighting fixtures permits housing installation by one man. After inserting the straps, the workman taps each prong a couple of times and the housing is in place, the manufacturer states. The workman then has both hands free to drive additional screws or nails.

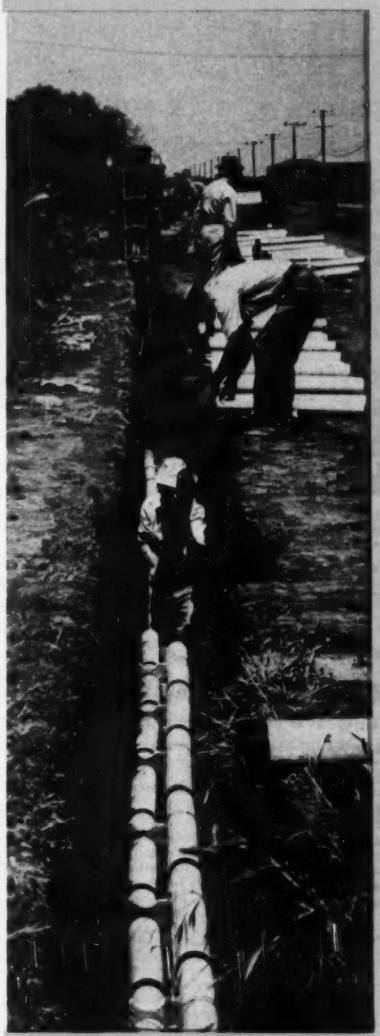
Drill and Saw

(27) Tec-Imports, 2249 Federal Ave., Los Angeles 64, Calif.

Of interest to electricians and television installers is a combination tool called Drilsaw. It is claimed to drill and saw in any direction and to make any shape hole. It comes in four sizes; is claimed to cut wood, plaster, wall board and plastic. It is made of alloy steel, takes rough use but is not brittle, according to the manufacturer. Sizes: 7 in., 3/16 in. diameter; 10 in., ¼ in. diameter; 13 in., 5/16 in. diameter; 15 in., ⅜ in. diameter.

(28) **PRISMATIC UNITS** — For entrances, courts, loading docks, yards, etc., these new units are of weatherproof construction, give protective as well as utility lighting over wide areas and high-angle light for upper vertical surfaces. Upward light from the lamp is redirected to useful downward light by the specular inner reflecting surface of the hood. Radius of effective coverage is said to be upwards of five times the mounting height above ground or floor. Made by Art Metal Co., Cleveland, Ohio.

SOAPSTONE *SUPERIOR* CONDUIT



How much money will be buried in this trench?

Not *too* much, because the duct is SOAPSTONE

Conduit cost is an important part of underground systems, but construction men find that SOAPSTONE is not only low on first cost but also lowers over-all costs on the job. It's easy to handle in tight places—the illustration shows an 8-way system (2 wide and 4 high) being laid in a trench 6½ feet deep by 18 inches wide. SOAPSTONE is delivered right to the trench-side. Simple, efficient collar-coupling and accurate spacers speed laying—the duct follows right behind the trenching machine.

Low first cost, less handling on the job and faster laying mean that no extra money is buried underground when you use SOAPSTONE *superior* conduit.

The smoothest of all conduits, SOAPSTONE is easiest on cables. Rapid heat dissipation, chemical inertness and inherent long life assure permanent circuit protection. The standard for encased underground duct systems for over 25 years.

SOAPSTONE superior conduit is available in a range of sizes from 2" to 5". Spacers, bell-ends, reducers and adapters for all normal and special situations.

For prices and detailed information contact:

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PERMANENT CIRCUIT PROTECTION

use CHAMPION LAMPS

FOR LIGHTING WITH MAXIMUM EFFICIENCY AT MINIMUM COST

CHAMPION Incandescent and Fluorescent Lamps have the uniform quality of illumination and lasting dependability in service that come only from years of specialization in the manufacture of lamps for industry. They COST LESS than any other lamps of equal quality . . . give MAXIMUM LIGHT for every cent of current consumed.

Liberal discounts on quantity purchases

PANAMA LAMP & COMMERCIAL CO., INC.

for better LIGHTING—it's PANAMA

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SLASH OPERATING COSTS...

with Tel-E-Lect POLE LINE EQUIPMENT

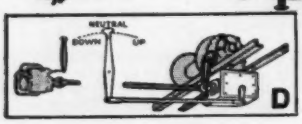
For installation on your present truck—or on new equipment

A POLE HOLE DIGGER . . . Uses your regular derrick and crew. Attaches by a single bolt to power take-off shaft. Adjustable for clean holes up to 10 feet deep. Interchangeable augers 8 to 20 inches diameter.

B DERRICKS . . . Both "A" frame and "T" type for front or rear mounting on all makes of trucks.

C UTILITY CABINETS AND MATERIAL RACKS . . . Bolts onto any flat bed truck. Gives needed facilities for pole line work at a fraction of the cost of a utility body.

D WINCH DRIVE BOX . . . Gives instant forward and reverse action to your winch. Permits operator to give all his attention to the winch job and speeds up work. *Easy to operate:* Simply engage power take-off just once. No further shifting to PTO or use of truck clutch required. Just move a single cab lever forward or backward to lower or raise the winch line. Available for single or double drum winches.



For literature or demonstration, write to

TEL-E-LECT PRODUCTS, INC.

10,025 MINNETONKA BLVD. MINNEAPOLIS 16, MINN.

Plastic Tubing for Small Components

(29) Irvington Varnish & Insulator Co., Fibron Division, 6 Argyle Terrace, Irvington 11, N. J.

A very fine diameter extruded plastic tubing has been developed for use on small and miniature electrical and electronic components. It is .012 in. ID, .012 in. wall but is claimed to have all the physical characteristics of the manufacturer's regular Temflex 105 and Transflex tubing. Samples available from Fibron Division.

Connector

(30) Pass & Seymour Inc., Syracuse 9, N. Y.

The redesigned 7082 3-wire polarized-cord-grip connector body features sturdy black Bakelite body with slots that take cap blades readily; extra-thick steel armored section and cord grip, zinc plated to resist corrosion; long-life contacts that are accurately positioned and have spring at base, far removed from arcing point; tapered wireways and large binding screws. This device has ¼- to 9/16-in. cord hole; is rated 15 amp, 125 v, 10 amp, 250 v.

(31) **INSTRUMENT PENS**—New industrial instrument pens claimed to eliminate flooding and to reduce paper plugging and choking have been announced by Minneapolis-Honeywell Regulator Co., Brown Instruments Division, Wayne and Windrim Ave., Philadelphia 44, Pa. The new pens have removable tips and a new reservoir construction that prevents flooding because the effective ink level is always below the writing tip.

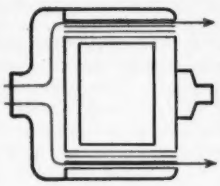
(32) **ANTISTATIC** — Merix Antistatic No. 79 is claimed to remove static charges on polystyrene luminaire panels, plastic eggcrate-type light fixtures, plastic electrical parts. Made by Merix Chemical Co., 1021 E. 55th St., Chicago 15, Ill.

Your *Best* Motor Buy

for Outdoor Installations

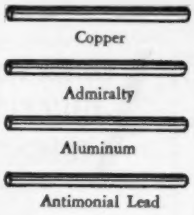
Here's Why

Practically Self-Cleaning



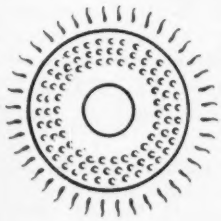
Air-to-air heat exchanger has straight, smooth tubes with no pockets in which dirt or moisture can collect. Velocity of cooling air through the tubes keeps surfaces swept clean. If sticky dirt should pile up, the tubes can be cleaned in a few seconds with a long handled brush.

Choice of Tube Materials



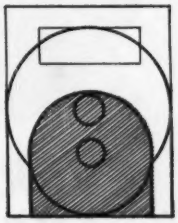
Allis-Chalmers tube-type motors can be built for service in corrosive atmospheres and for outdoor operation in almost any climate. Tubes may be made of a variety of materials, depending on service conditions.

Uniform Cooling



Tubes for carrying cooling air are distributed uniformly around the perimeter of the stator and along its full length. Result: heat travels over a short path and the interior is uniformly cooled.

Compact



Allis-Chalmers tube-type motors are little or no larger than open motors of the same rating. Tube-type design exposes large surface area to cooling air in minimum space.

Get Complete Information Now — Ask your Allis-Chalmers district office representative about tube-type, totally-enclosed fan-cooled motors in sizes up to 2000 hp. Or write Allis-Chalmers, Milwaukee 1, Wis., and ask for Bulletin 51B7150.

A-2747

ALLIS-CHALMERS

PARANITE HYDRO-THERM BUILDING WIRE

● Paranite Hydro-Therm combines in a single wire the heat-resistant qualities of Type RH and the moisture-resistant qualities of Type RW.

USED IN DRY LOCATIONS Paranite Hydro-Therm carries more current per dollar of cost. The higher amperage rating for Type RH wire under the National Electrical Code provides greater current carrying capacity. You can use smaller conductors, smaller sizes of conduit; and lower your labor costs.

USED IN WET LOCATIONS Paranite Hydro-Therm is rated as Type RW wire for 60°C operation because of its excellent moisture-resistant qualities.

IF IT'S **PARANITE** IT'S RIGHT!

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Division of ESSEX WIRE CORPORATION
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ELECTRICAL WIRES AND CABLES "BETTER THAN CODE REQUIRES"

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of SMALL
TRANSFORMERS

—in the JEFFRIES line

Practically all your small transformer needs are supplied by the Complete Jeffries line. We have specialized for years in providing transformers to exactly match your requirements. If not in our regular line, we build to meet your specifications in a hurry!

Minimize your voltage losses. Specify scattered transformers to eliminate duplicate conduit runs, and save on power costs.

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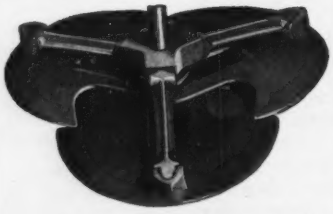
1710 E. 57th St. Los Angeles 11, Calif.

EXTRA Holding Power
QUICKLY Installed
TOUGH For long life



EVERSTICK ANCHORS

For new construction and maintenance —Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resilient, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

(33) Approval of its connectors and couplings from ½ to 1 in. as concrete-tight per Underwriters' Guide Card No. 104L6 has been announced by Briegel Method Tool Co., Galva, Ill.

Instrument Tests Conductive Floors

(34) Associated Research Inc., 3758 W. Belmont Ave., Chicago 18, Ill.

Vibrotest model 267 is a push-button instrument to measure electrical resistance of conductive flooring in accordance with National Fire Protection Assn. bulletin 56. It will test conductive floors where static charges or stray electrical potentials may cause explosions in hazardous atmospheres or materials. Checks can be made to show changes in floor conductivity caused by wear, washing, waxing, etc. The instrument can be used for electrical insulation resistance measurements as well as wiring continuity and voltage checks.

Model 267 has ranges of 0-20 megohms at 125 v d-c test potential and 0-200 megohms at 500 v d-c test potential; also ranges of 0-20,000 ohms and 150-300-600 v a-c and d-c.

Cable Cutter

(35) The Thomas & Betts Co. Inc., 70 Butler St., Elizabeth, N. J.

This new hand tool features a heart-shaped opening between jaws, claimed to give a clean, true cut, free from jagged ridges across the center of the cable. Designated catalog No. 365, the new cutter is said to be adapted equally well to bare or insulated copper or aluminum cables up to 500 MCM. It accommodates outside insulation diameters up to 1½ in.

For more data fill in coupon, page 76

NO ACROBATICS in lamp changing with—

APPLETON V-51 VAPORTIGHT FIXTURES

WITH MALLEABLE IRON BODIES
100 WATT OR 150/200 WATT UNITS

Change lamps at the work bench!

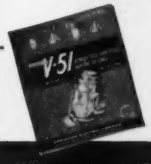
Here's a vaportight lighting fixture that sets a new high in safety, efficiency, ease of installation and maintenance! In the V-51, an exclusive "Unit Assembly" combines receptacle, globe and guard in a *single unit* . . . instantly detachable—without tools—for relamping or cleaning.

Reflector is quickly attached or removed—thanks to exclusive neoprene rubber ring suspension. Shock-absorbing socket in "Unit Assembly" permits the use of standard type lamps.

The new V-51 line includes 18 different types of rugged malleable iron bodies for pendent, ceiling or bracket mounting. *Complete interchangeability of parts* permits the assembling of 256 complete fixtures, using only 32 basic components!

Malleable Iron Fixture Body ½" or ¾" Hubs
APPLETON
Neoprene Rubber Ring Attachment
One of Four Reflector Styles Baked Porcelain Enamel Finish
APPLETON
Patent Applied for
Exclusive Unit Assembly (Receptacle—Globe Guard)

Write for Bulletin 5-A containing complete details on the new Appleton V-51 Convertible Vaportight Fixture.



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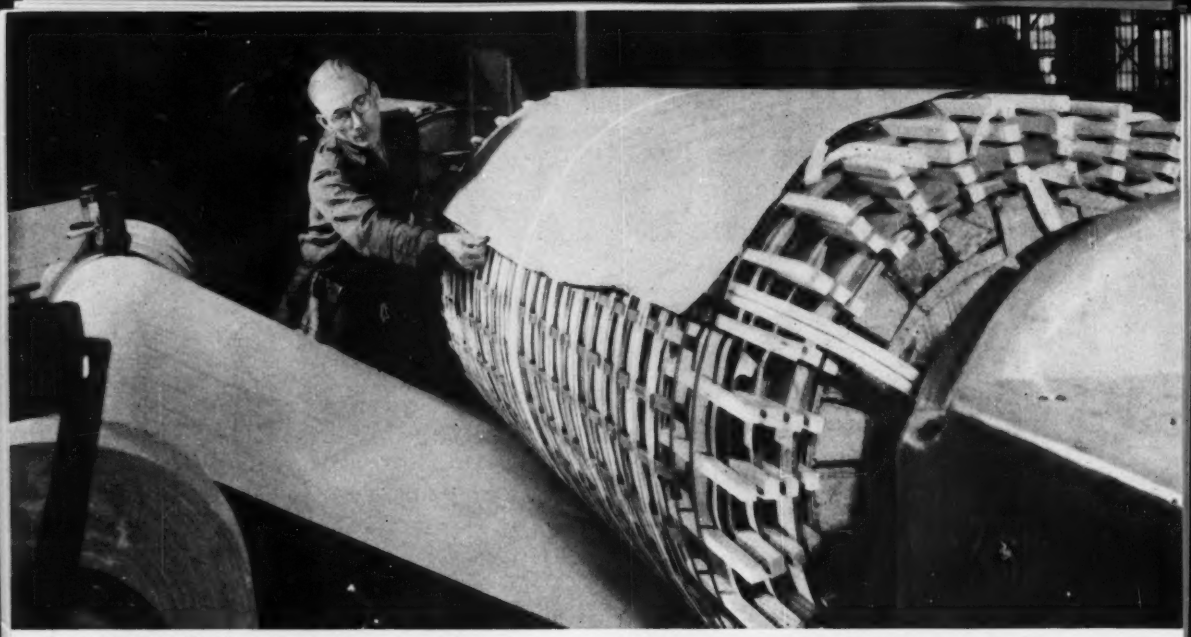
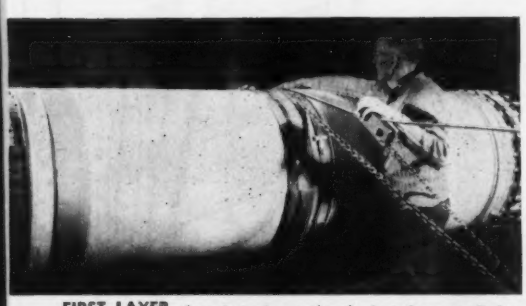
BINGHAMTON • DALLAS • INDIANAPOLIS • KANSAS CITY • ORLANDO MILWAUKEE • NEW ORLEANS • SEATTLE • PORTLAND, ORE.

Export Field Engineers:
International Standard Electric Corp., 67 Broad St., New York 4, N. Y.

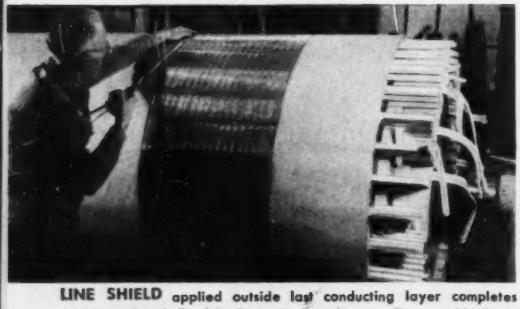


"CONCENTRIC LAYER" winding for 42,500-kva, 230-kv/132.8-kv GrY transformer. Workman is starting a layer of Kraft paper insulation. Other layers of insulation can be seen at the near end—separated by temporary wooden spacers. Later, these wooden spacers will be removed and the insulation will be flanged over the ends of the windings.

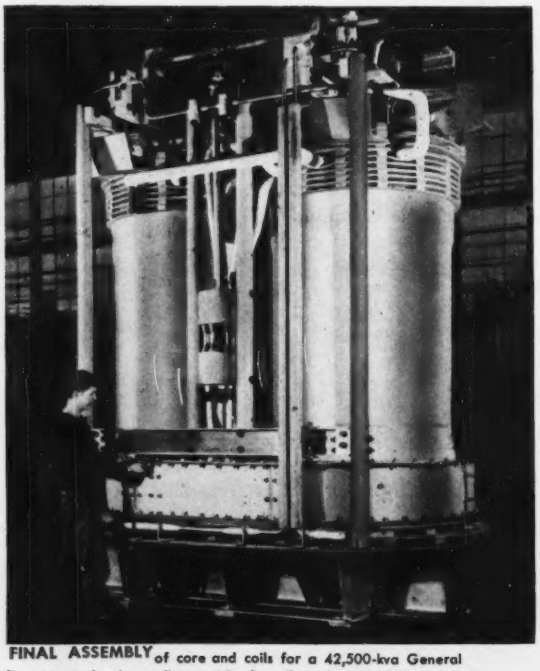
Here's "CONCENTRIC LAYER"..



FIRST LAYER of conductor is wound on laminated paper cylinder. Friction ring holds coil tight during winding. Each layer is clamped tightly while succeeding layers are wound.



LINE SHIELD applied outside last conducting layer completes shielding of coil. Final "cylinder" of insulation will cover this shield to complete the winding.



FINAL ASSEMBLY of core and coils for a 42,500-kva General Electric single-phase "concentric layer" power transformer is completed.

The power transformer winding that meets all the requirements for very high voltage

"Concentric Layer" windings provide important advantages on all G-E transformers 750-kv BIL and above

● **Uniform distribution of impulse voltages** and the elimination of harmful oscillations are characteristic of "concentric layer" construction. As a result, voltage stresses can be calculated accurately and insulation applied precisely as required.

● **Lower weights and dimensions.** Voltage stresses between the low- and high-voltage windings are reduced to a fraction of those occurring with other types of construction. Space factor is improved, and the reduction in weights and dimensions permits a larger kva unit to be built in a one-piece tank.

● **Effective inter-layer cooling.** Vertical ducts between layers permit unrestricted oil flow past each conductor.

● **Greater mechanical strength.** Major magnetic stresses in the "concentric layer" winding appear as *tensile* forces. These are inherently easier to withstand than the *bending* forces which occur in non-concentric designs. A full size "concentric layer" transformer successfully passed short-circuit tests at *rated* voltage, demonstrating the great mechanical strength of these windings.

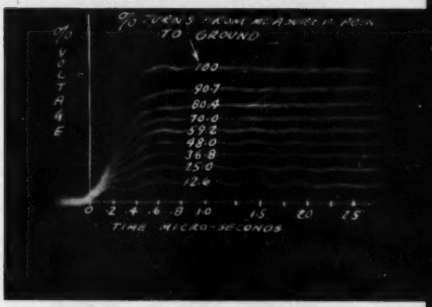
G-E "concentric layer" transformers now being built at a rate of 2,500,000 kva per year!

Calculations and tests show that from every angle the "concentric layer" winding is superior. Since 1940, all new G-E transformer designs, 750 kv BIL and above, have included this winding. Today, with the rising trend to higher system voltages, shipments of G-E "concentric layer" transformers are exceeding 2,500,000 kva per year!

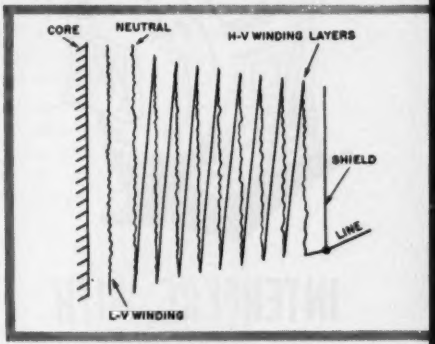
If you are contemplating voltages of 161-kv and above, you may wish to review the data on these windings. Ask for GER-129. Address inquiries to your nearest G-E Apparatus Sales Office, or write directly to Section 401-28, General Electric Company, Schenectady 5, N. Y.

"Concentric layer" windings consist of a number of cylindrical layers arranged concentrically, as shown on these pages. The innermost layer, adjacent to the low-voltage winding, is connected to the neutral. Then, successive layers are connected in series progressively, with the outer layer being connected to the line.

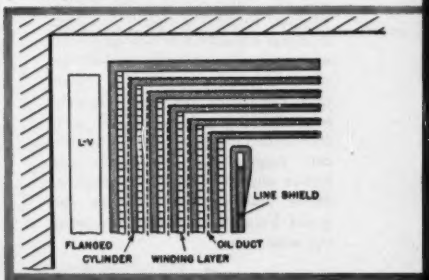
Basic insulation is provided by cylinders of insulating material. These cylinders are flanged over the ends of the winding to eliminate creepage paths in the direction of high electrical stress. The *entire* winding is protected from transient voltage stresses by electrostatic shielding.



ACTUAL OSCILLOGRAM showing voltage to ground at equally spaced points in the winding when 0.6 x 190 microsecond impulse wave was applied to line end. Absence of large oscillation is indicative of uniform impulse distribution.



WINDING CONNECTION DIAGRAM shows that voltages between layers and between high- and low-voltage windings are only the voltage of one layer since successive layers are connected in series progressively.

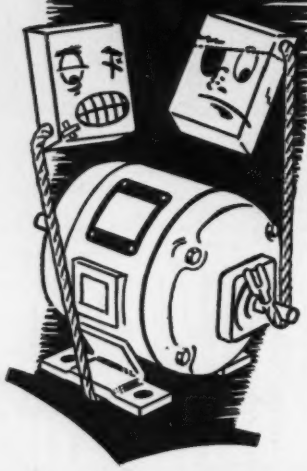


EFFECTIVE INTER-LAYER COOLING. Schematic diagram of "concentric layer" winding showing six layers insulated by flanged cylinders. Dotted lines show path of oil past each turn of the winding.

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

Don't Let
FAULTY
BRUSHES



INTERFERE WITH
PROPER OPERATION

Did you ever see a small tractor attempt to haul a heavy load up a steep hill when a big powerful unit could do it with ease? This same example applies to motor and generator brushes. Properly engineered products of this sort, such as are made at "OHIO," make any commutating machine's job easier and extends the normal life. Make your choice: — *pennies for good brushes, or dollars for worn out machines.*

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544 S. San Pedro St.
Los Angeles 13, Cal.

ORDER YOUR CARBON BRUSHES FROM A SINGLE SOURCE

THE OHIO CARBON COMPANY
12508 BEREA ROAD • CLEVELAND 11, OHIO

BULLETINS ETC.

(36) MOTORS—A booklet giving construction details of its explosion-proof fan-cooled and nonventilated motors is available from Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis. Fan-cooled type APZZ motors come in ratings of 3 to 100 hp and nonventilated type APKK from ½ to 2 hp. They are Underwriters' approved for use in class 1, group D, and class 2, groups F and G atmospheres.

(37) LAMINATES—Grades of Textolite industrial laminates are covered in catalog CDL-38 published by the Chemical Division, General Electric Co., Pittsfield, Mass.

(38) WIRING DEVICES—Leviton Mfg. Co., Brooklyn 22, N.Y., lists its line of wiring devices for industrial, commercial and residential use in its 96-page catalog 51. Dimensions and wiring diagrams are included.

(39) INFRARED OVENS—Included in a recent bulletin from Triangle Equipment Co., 45 River Road, Nutley, N.J., is a section on infrared ovens. Other sections in the bulletin cover overhead conveyors, load toters and boosters, and freight ladders.

(40) GENERATORS—Series AG package steam generators made by Foster Wheeler Corp., 165 Broadway, New York 6, N.Y., are described in catalog PG-51-2. These units come with or without superheat.

(41) LIGHTING—Data sheets on its line of fixtures and equipment have been prepared by Silvray Lighting, Inc., 100 W. Main St., Bound Brook, N. J.

(42) OVENS—Oven-King electric bake ovens are described in a bulletin released by the new owners, Washington Industrial Products, 3600 Airport Way, Seattle 4, Wash.

(43) SILICONES—"What's a silicone?" is answered in a booklet offered by Dow Corning Corp., Midland, Mich. The 32-page illustrated brochure describes silicones in terms of what they do.

(44) FANS—A catalog and engineering bulletin describing 30 fan types in more than 300 sizes is available from Chelsea Fan & Blower Co., Inc., 639 South Ave., Plainfield, New Jersey.

(45) SWITCH—Data sheet 63 on its make-before-break snap-action switch BZ-2G has been released by Micro Switch, Freeport, Ill.

(46) CONNECTORS—Grounding sheath connectors are described in a bulletin from the Thomas & Betts Co., Elizabeth 1, N. J.

(47) SWITCHGEAR — An illustrated booklet (B-5282) on unitized low-voltage metal-enclosed switchgear is available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

(48) REPRINT — The article, "Parallel Tap Changing Under Load," by H. L. Prescott is available in reprint form from Westinghouse Electric Corp., Department T, Transformer Division, Sharon, Pa. It is designated Reprint No. 4776.

(49) BRUSH CONTROL—A folder giving data on chemicals for clearing rights-of-way has been released by Thompson Chemicals Corp., St. Louis 3, Mo.

(50) CAPACITORS—Catalog 200C from Cornell-Dubilier Electric Corp., Jobber Division, South Plainfield, N.J., lists the manufacturer's line of service replacement capacitors. It supersedes catalog 200B.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good After August 1

Please send me, without obligation, the new product information or catalogs described on the following pages and identified by numbers circled below:

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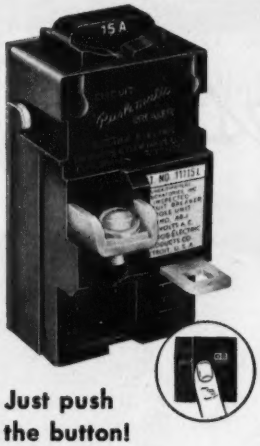


Just push the button!

Famous, Foolproof Pushmatic
Circuit Breakers are individual, interchangeable units that provide automatic, trip-free circuit protection always. Rupture circuits instantly when trouble occurs. Need no resetting. Just a simple push restores service. Available in 15, 20, 30, 40 & 50 Amps. Install quickly, simply . . . give unmatched flexibility to BullDog Electri-Centers. Guaranteed. Listed by Underwriters'.

New low price!

BullDog Reduces Pushmatic Prices

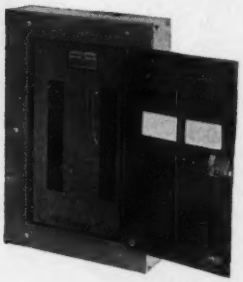
You save up to 35% on genuine Pushmatic Circuit Breakers, Electri-Centers, Accessories.

Now, all Pushmatic prices have been drastically reduced!

There has been no sacrifice in quality, no change whatsoever in the products. You save up to 35% on genuine Pushmatic® Circuit Breakers, Electri-Centers and Accessories. Get all the well-known Pushmatic advantages at the price of ordinary circuit-breaker equipment.

Popular demand, new production facilities make this reduction possible. A new BullDog plant (Bellefontaine, Ohio) is devoted exclusively to producing the Pushmatic line. Production is up, costs down . . . you share in the savings when you buy Pushmatic.

No need to let price make you settle for second best. Check the convenience, flexibility and all the top-quality features of Pushmatic Electri-Centers at your local BullDog supplier's, or write for descriptive bulletin. Compare the *new low price.*

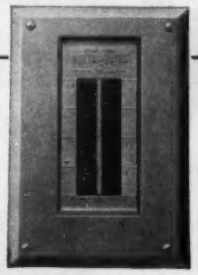


P2B Electri-Centers
with Pushmatics. Fully flexible, adapt to *any* job, on the job . . . available in minutes from local suppliers' stocks. Up to 42 circuits.

New low price!

XD Electri-Centers
for homes, small businesses. Feature split bus bars, Pushmatic protection, *one* central control for all home circuits. Accommodate up to 18 circuits.

New low price!



Service Electri-Centers
also equipped with modern, safe Pushmatic Circuit Breakers. Adapt quickly, easily to present, future needs. Eliminate fuses. Up to 8 circuits

New low price!

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BULLDOG ELECTRIC PRODUCTS COMPANY
DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES
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PIONEERS IN FLEXIBLE ELECTRICAL DISTRIBUTION SYSTEMS

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B-M *Fittings*

ARE APPROVED AS CONCRETETIGHT

When setting E. M. T. in concrete you can make each job easier and more profitable by using Briegel All Steel Indenter Fittings that have UL approval as CONCRETE-TIGHT. Contractors the world over recognize their cost cutting qualities and the fact that they make each wiring job a better job. It is only natural that Briegel Fittings are the most widely used E. M. T. connectors and couplings.

Cross Section Showing Indentations.

BRIEGEL METHOD TOOL CO.
GALVA, • ILLINOIS

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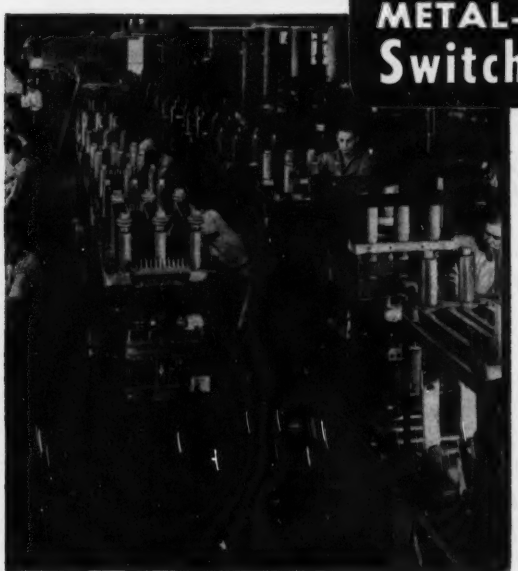
The M. B. Austin Co., Northbrook, Ill.; Clayton Mark & Co., Evanston, Ill.; Clifton Conduit Co., Jersey City, N. J.; General Electric Co., Bridgeport, Conn.; The Steelduct Co., Youngstown, Ohio; Pittsburg Standard Conduit Co., Pittsburgh, Penn.; Wagner Malleable Products Co., Decatur, Ill.; J. R. Richards Co., Carnegie, Penn.; Kondu Mfg. Co., Ltd., Preston, Ont.

★ EVERY CIRCUIT BREAKER
★ EVERY STATIONARY ELEMENT

...Built to Master Jigs!

Perfect alignment of all parts is assured by jigs. Master jig of removable element is shown inside stationary element. Operation of elevating mechanism also checked with this same jig.

ALLIS-CHALMERS METAL-CLAD Switchgear



A number of jigs are used in building the removable elements. Two are shown in circuit breaker assembly line. This care during manufacture pays off in ease of installation.

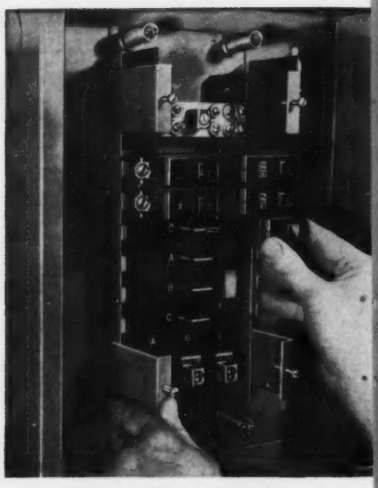
For Fast, Easy Installation... Interchangeability Between Units of Same Rating

THIS IS JUST one example of the care taken in manufacturing Allis-Chalmers switchgear. Every step in building, every detail of construction, receives this same careful attention. It will pay you to find out more about Allis-Chalmers switchgear. Call your nearby Allis-Chalmers District Office for complete information, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3730

ALLIS-CHALMERS

First in the U. S. with Metal-Clad Switchgear



QUICK-MAKE, QUICK-BREAK PLUG-IN BREAKER—Trumbull's new NLTQ Panelboard introduces the first *plug-in* circuit breaker with quick-make, quick-break operation. Other features: both *thermal* and *magnetic* protection . . . trip-free . . . pressure-type silver-plated copper plug-in contacts . . . all ratings physically interchangeable. Adjacent breakers are on alternate phases—assuring balanced loads and circuits.

New insulating material

KEEPS PANELBOARDS COOLER

The base of this panelboard interior is made of *Plastisol* . . . the first time this amazing plastic material has been used for this purpose.

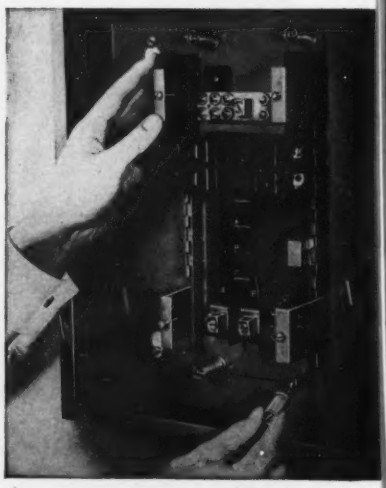
Here are some of the properties which make Trumbull's new NLTQ Panelboard a superior product which will give you excellent service.

Plastisol has very high thermal conductivity and is an excellent radiator of heat. Copper bus bars encased in Plastisol run 10% cooler than in open air!

SUPERIOR TO ALL OTHER TYPES OF INSULATION

Other Plastisol advantages making it superior to all other types of insulation for this purpose include its ability to resist acid and alkali, high temperatures (not harmed at 212 F), tracking and carbonizing. It will not shrink or become brittle, even at minus 30 F.

Trumbull's Plastisol base is Underwriters' Laboratories, Inc. approved and endorsed by the Electrical Council.



QUICK INSTALLATION—NO NUTS AND WASHERS—Interior is mounted in box by compression springs . . . which permit easy release for removal. Springs also permit lining up fronts regardless of uneven box installation. Trumbull NLTQ panelboards with lug or circuit breaker mains come in capacities up to 225 amperes in a range of 4 to 42 circuits. Write for Bulletin TEB-14.

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.

How Burndy Hysplicing Cut Installation Costs 70%

HYSPLICE

70% saved!

You may not repair overhead transit lines, but the story of how Seattle Transit System reduced splicing time on corroded guy wires from 20 minutes to 3 minutes may well apply to your operation.

The "secret" is the Burndy Hysplice installed with the Burndy Hypress Y48B, a portable hydraulic press weighing only 27 pounds but developing 40 tons, *80,000 pounds*, of force...a weight/force ratio unequalled for easy handling of splices and connections on larger cables.

In this application the corroded section is replaced with a three-foot length of new wire, coated at both ends with a corrosion resistant compound and inserted into the Hysplice. The enormous force of the Hypress crimps the Hysplice in a four-indentation die—completing each crimp in a single operation. Time? Just about three minutes to replace an entire section—even less if one side of the splice is made up in advance. A 70% time and manpower saving over the old fan splice method. And since the Hypress can install splices up to the rated breaking strength of a cable, pull-out tests prove its adaptability to any type of service in the field.

Perhaps costs can be cut, efficiency improved, in some phase of *your* operation. Call Connector Headquarters...

BURNDY

BURNDY ENGINEERING COMPANY • NORWALK, CONNECTICUT
BURNDY CANADA, LTD., TORONTO 8, ONT.

52-4

To get efficient fluorescent lighting ... insist on *This Shield on your ballast*

There's more to satisfactory fluorescent lighting than lamps and a reflector. There's always a ballast in the fixture . . . and the way it performs determines whether you'll get *full lamp life, rated light output* and *satisfactory performance.*

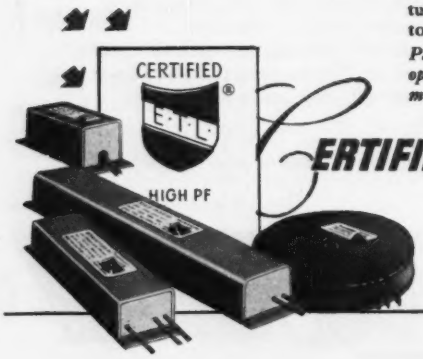
Only CERTIFIED BALLASTS carry the shield that assures best lighting. That's because CERTIFIED BALLASTS are made to precise specifications, then tested by Electrical Testing Laboratories, Inc., which certifies they conform to these high standards.

There's no excuse for inefficient, unsatisfactory fluorescent lighting when CERTIFIED BALLASTS are available.

Be sure every fixture you get has CERTIFIED BALLASTS . . . the ones with the shield.

● Complete information on the types of CERTIFIED BALLASTS available from each participating manufacturer may be obtained from Electrical Testing Laboratories, Inc., East End Ave. at 79th St., New York, N. Y.

Participation in the CERTIFIED BALLAST program is open to any manufacturer who complies with the requirements of CERTIFIED BALLAST MANUFACTURERS.



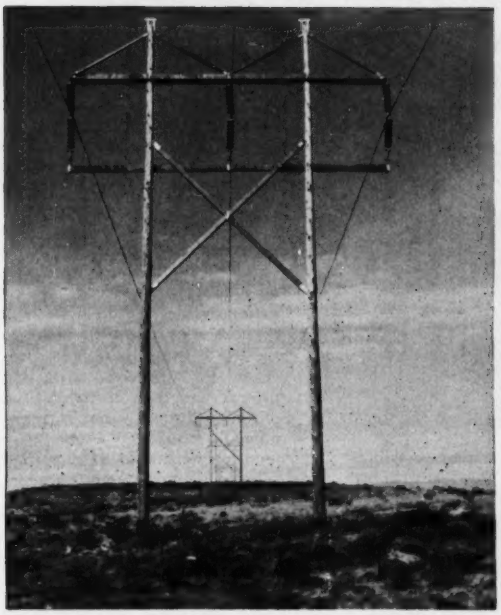
CERTIFIED BALLAST MANUFACTURERS

Makers of Certified Ballasts for Fluorescent Lighting

2116 KEITH BLDG., CLEVELAND 15, OHIO

Demand PROOF OF PERFORMANCE

for Locations like these

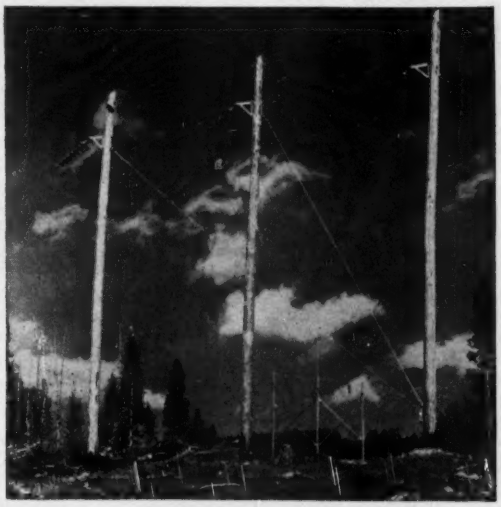


Thomas Insulators make certain that this 230-kv hold-down structure will give satisfactory service for decades to come.

"Where the going is rough . . . where trouble-free performance is a must . . . that's where Thomas *superior insulator quality* really pays off."

Shown on this page are just two of the many Thomas installations on the lines of a large Western Utility. For many years, this Customer has given us order after order. Such *repeat orders* from this and other companies are the best testimonials to the long life and outstanding performance of Thomas Insulators.

After all is said . . . it's still quality that counts plus proper designing, precision manufacturing . . . and PROOF OF PERFORMANCE. Throughout the world, Thomas Insulators have been establishing service records since the advent of the Electrical Industry. Why gamble?



For this 69-kv medium-angle structure, Thomas Insulators have the stamina that assures long life and trouble-free performance.

The R. Thomas and Sons Company is a manufacturer and designer of all types of porcelain insulators . . . pin-type, switch, suspension, spools, guy-strain, bushings and special high-voltage porcelain. In addition, Thomas supplies associated line hardware, clamps, fittings, preformed armor rods, and so on.

SPECIFY THOMAS INSULATORS—THE BEST BY LINE TEST

— Since 1873 —

The R. Thomas and Sons Co.

1873 THOMAS INSULATORS our 79th year RELIABILITY 1952

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NEW YORK CHICAGO

Sales Representatives: C. G. Anderson, *Chicago* • E. B. Anderson Co., *Detroit* • Ken H. Best, *Seattle* • R. E. Cunningham & Son, *Los Angeles* W. H. Eddy Products Co., *Phoenix, Ariz.* • Engineer Sales Corp., *St. Petersburg* • R. F. Hamilton & Associates, *Denver* • Geo. E. Honn Company, *San Francisco* • W. J. Hugo, *Minneapolis* • Leiser & Company, *Philadelphia* • John G. Pettijohn Company, *Knoxville* • H. E. Ransford Co., *Pittsburgh* • J. F. Schaefer & Co., *Kansas City* • R. J. Sullivan & Company, *Boston* • Tafel Electric & Supply Co., *Louisville* • Walter E. Thompson, *Birmingham* • Triangle Electric Supply Company, *El Paso* • United Electric Supply Co., *Salt Lake City* • Williamson Sales Co., *Shreveport, Amarillo, Dallas, Houston, New Orleans, Pine Bluff* • *Representatives in other principal cities*

ELECTRA'S HUSBAND

"WHICH one of the five jobs did Jim Ames decide to take when he leaves college?" Electra asked one Sunday evening recently just as I switched off the radio at the conclusion of the Standard symphony.

"Five nothing," I countered. "Before he was finished interviewing and being interviewed, he had eight offers. But then his case isn't very much different from that of any young graduating engineer. There simply aren't enough engineering students in the colleges and universities to take care of the demand. I was reading the other day where some statistically minded individual figured that there are 4,207 companies engaged in directly soliciting engineering graduates and that they need 87,000 new people to fill the jobs they have available. To top it off there are only 29,000 young people being graduated in engineering. That's an average of almost three jobs for every graduate."

"Then Jim must have been exceptional with eight offers," she said. "But what I want to know is which job did he take?"

"Well I don't know for certain," I said. "I advised him to take the position offered by the company his father worked for before he died. It would involve two years of training which would be just like post-graduate study. But he was enamored with a proposition from one of the oil companies for a job in Arabia or Venezuela or some foreign country. The pay was almost three times what any of the domestic jobs would return. Then there is a certain amount of romance in those overseas jobs. I had the same bug before I left school."

"He would be silly to leave this country," Electra said.

"I agree, but then you don't appreciate the tremendous selling jobs some of these companies do in recruiting graduates. The competition really is rough and a young fellow is liable to miss the solid elements of a job possibility for some of the romance. The aircraft companies are the outfits that need engineers in the worst way. They not only recruit but they raid also. I could tell you some rare stories about them. However, the starting rate for young engineers has been going up steadily ever since the end of the war. Moreover, the attitudes of the youngsters are different. Many of them got part or all of their education at government expense, which means that they did not have to work. Then they are more demanding. Top that off with the overselling that some companies are doing and you have a tough situation for folks like the electric utilities. Their starting scales are so far down the line that they are lucky to pick up the least desirable.

MORE ENGINEERS LESS DEPENDENTS

"Just to show the extent to which some companies will go, I heard the other day that one organization offered to employ every single engineering graduate at one of the universities sight unseen. There was another story to the effect that many companies are making attractive offers to junior students to work for them during summer vacation just in the hope that they might have a lien on them on graduation."

"That's not a bad idea," she commented.

"The best story of all, however, shows just how competitive the situation is this year," I continued. "Down at one of the southern California colleges a young interviewer for one of the big national companies was mistakenly included in a group of graduating engineers to listen to the story from another recruiter. He was so impressed with what his competitor had to offer that he signed up to go with that organization before he realized what he was doing."

"Maybe you ought to interview your company and see what kind of an offer you might get," she said.

"YOU can see how the government bureaus arrange things to perpetuate themselves," said a farmer-business man speaking at a recent meeting. "If you go up around the Grand Coulee project you'll see the so-called Bureau of Reclamation out 'reclaiming' that area right now. The place is alive with bulldozers leveling off the land for irrigation from waters brought down the Grand Coulee. It doesn't matter that it is land that should never be leveled. The layer of topsoil is thin. What they are doing is to push the good top soil into the gullies to fill them and leave soil on top that will take several years of working and fertilizing to make it fit to produce a good crop.

"So you see, in a few years the bureau will be back to reclaim the land that it is reclaiming now. The flood and rill irrigation on leveled-off land will eventually bring all the alkali to the top because there is no provision for drainage, so a big project will then be made of a drainage district. That is 'planning' for you."

Depends on what you are planning, I say. The bureaucrats seem less interested in planning the wise use of land and water for the benefit of man than in planning the life of the man for him. Land and water are excuses for power, and perhaps it is not mere electric power, either.

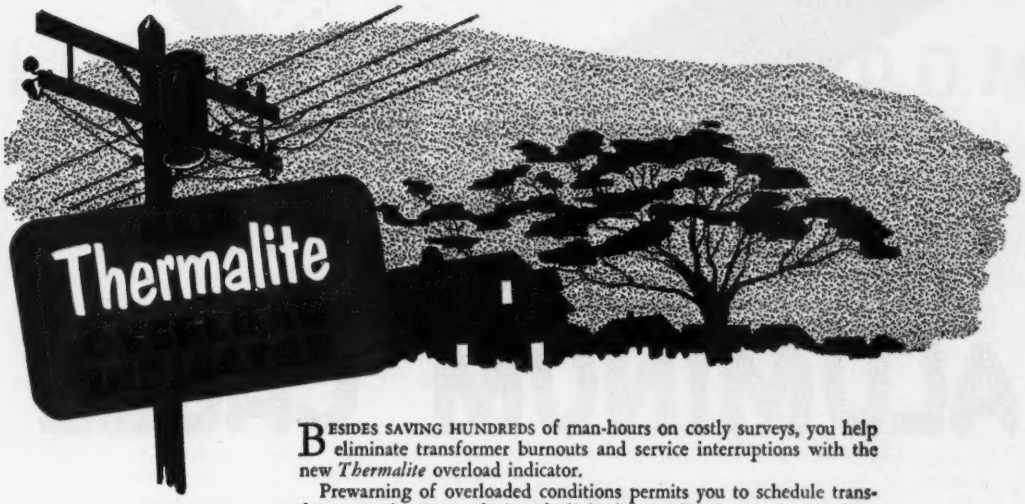
"But that was an awfully nice thing that happened up there at the celebration for the starting of the irrigation project below Grand Coulee," Electra said with a touch of emotion in her voice. "Didn't you read about all those people getting together and building that veteran a complete farm in a day, as a sort of symbol of what it means to the people who are going to settle on that land. They even built and completely furnished a house, as well as planted his fields, built a barn and furnished him with farm equipment."

"Maybe I'm an old meanie," I responded, "but I see in that a different symbol than your kind heart has seen in it. And many others will be dazzled by the same publicity glitter. What I cannot help see in it is the aim to plan completely that man's life and leave him no self reliance or self respect, a willing robot in a socialist planned colony."

"You don't mean they'll plan when he can have children?" asked Electra.

Here's the Low Cost Way

TO DETECT TRANSFORMER OVERLOADS



Time Saving Visual Check of Transformers with Thermalite Device Offers Permanent, Continuous and Inexpensive Load Check

BESIDES SAVING HUNDREDS of man-hours on costly surveys, you help eliminate transformer burnouts and service interruptions with the new *Thermalite* overload indicator.

Prewarning of overloaded conditions permits you to schedule transformer replacements during daylight hours. But in no case is there interruption of power service . . . because the *Thermalite* indicator operates purely as a signal device. It provides quick warning that the transformer should be replaced with a larger transformer or the load rearranged at the earliest convenient time.

Quiet in operation and simple in construction, the low cost *Thermalite* indicator is recommended for systems where more expensive devices are not feasible.

NOTE THESE IMPORTANT ADVANTAGES

1. The red warning light is actuated by a thermostatic element in the top oil. Light remains on until reset by convenient handle.

2. The device is engineered, calibrated and installed at the factory. It costs virtually nothing to maintain and it is dependable in operation.

3. It operates in all types of weather and is well protected from the elements. The brilliant light permits you to check overloading conditions visually from your service truck.

For more information contact your A-C sales office. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3692

Thermalite is an Allis-Chalmers trademark.

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The Allis-Chalmers overload indicator is available on distribution transformers 100 kva and smaller, 15 kv and lower.

A "NATURAL" *for* ALUMINUM CABLE

If your plans call for the installation of aluminum cables on the basis of copper size, we would like to suggest that you consider the following point. Aluminum will heat to a greater extent than copper when the same amount of current is put through the cable.

So instead of using conventional insulations, which are seldom rated more than 140 F. (60 C.), specify Simplex-Anhydrex XX insulation. This will help overcome the heat problem because Anhydrex XX is rated at 176 F. (80 C.).

Simplex - Anhydrex XX insulation will operate at temperatures up to 176 F. (80 C.) in either wet or dry locations at voltages up to 17,000.

If you must use aluminum because of the copper shortage, let our engineers help you with your problem.

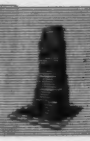
We would be more than happy to give you the latest specification data on Simplex-Anhydrex XX insulation. Simply send your request to the address shown below.

Simplex-Anhydrex XX is a product of Simplex Research.

SIMPLEX-ANHYDREX XX

SIMPLEX WIRE & CABLE CO.
79 Sidney St., Cambridge 39, Mass.

ELECTRICAL WEST
SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.



LIBERTY AND FREEDOM

IT may well be that before its ending 1952 will mark the beginning of a new era of liberty and freedom in America. Without a restoration of the principles of responsibility, individuality, enterprise and democracy, in this year of decision, it could well be that freedom and liberty will go into a decline from which there can be no return. In fact there are those who freely predict so much has now been lost that to recapture even a trace of what we as free people once enjoyed is an impossibility.

Whether we as Americans will turn aside from our worship of the Golden Calf of the Security State is a matter for individual determination. It will be decided by individuals each acting in accordance with his own beliefs. Do enough people believe sincerely in the values and attributes of liberty to bring about such a change? Is there a moral, intellectual and spiritual basis for change?

In seeking to answer these and other similar questions we picked up a little brochure written by ex-Westerner Leonard E. Read, entitled "Outlook for Freedom." In it there is a list of attitudes and values "which, if lived by and attended to" will assure success in the present quest for freedom and liberty. We set some of them down because they express concisely and clearly a theme for this Convention-in-Print.

"First, one should possess a belief in an Ultimate Wisdom . . .

"Second, one must perfect his own intellectual integrity: the faithful and accurate reporting, by deed and by word, of that which one conceives to be right . . .

"Third, is the necessity for humility in the proper sense, that is humility before truth rather than servitude to a natural master . . .

"The fourth precondition is a desire for individuality—a love of freedom that is born of reason . . . Desire only that others leave one free to be one's self, and wish them to be free so that all may voluntarily join their differing aptitudes and abilities into that harmony which makes for progress.

"Fifth is an awareness that the responsibility for one's self is the most important possession of man . . .

"The sixth precondition is the determination to follow principles rather than expediencies, ideals rather than conveniences . . .

"Seventh is a rejection of the use of coercion as a means to achieve creative ends . . .

"Eighth is a recognition that action in behalf of freedom stems only from understanding, including an appreciation of the manner by which understanding is reached . . . Understanding comes through individual endeavor . . .

"The ninth precondition for the advancement of freedom is a willingness to be with the minority, no matter how small, when the tides of unreason are on rampage . . .

"Tenth is a spirit of inquiry. Without a persistent, endless search for the truth, liberty is left stranded and unguarded against collectivistic cliches and other assaults . . .

"Eleventh is patience. If one would make haste, let him first be certain that he is not hurrying in the wrong direction . . .

"Twelfth precondition is ideological poise or stance, the ability to retain hope and high quality effort in the face of steady streams of daily announcements of men everywhere in the world putting shackles on man . . . "

We commend this code to all who read in the certain belief that people in our industry are freedom-loving individuals. As such they will exercise the freedom of choice that will bring an era of liberty consistent with the aspiration and dignity of man.

George C. Tenney

EDITOR

Seldom in its history have greater demands been imposed on the electrical industry. In facing up to these future commitments the industry should always remember according to EMORY D. SHERWIN, president of PCEA, that a sound policy is to

KEEP AHEAD OF PUBLIC DEMAND

Emory D. Sherwin is president of the San Diego Gas & Electric Co., a utility that has been faced with meeting the demands of the fastest-growing region in the United States

OUR electrical industry has in these last few years been called upon to supply the increasing demands imposed upon it by both "war" and the present defense effort. On a number of occasions government agencies have expressed doubts as to our ability, both to estimate future requirements and to manufacture and install the necessary equipment and machinery to supply the nation's power requirements.

In spite of efforts to discredit us and to hinder our program, we know that our industry has succeeded in making available to all users the necessary energy when and where needed. Each year the importance or necessity of electrical energy has increased both in the home and in industry. Fifteen years ago a failure of electrical supply would have resulted only in a serious slowdown of industrial production. Today we find that electrical energy plays such a major role in production that its failure would result in an almost complete shutdown of all our manufacturing processes.

In the days ahead we will be called upon for continued effort to maintain our production of power equal to the demands. Perhaps some of you feel that usage per residential customer or unit of industry has just about reached its peak. You might find it interesting to dig into your old files of estimates made, say in 1935, when you and your associates predicted long-term trends. Even if you neglect the unprecedented population growth on the Pacific Coast and simply look at your estimate of what the average residential kilowatt-hour usage would be in 1952, the chances are that many of you will be so ashamed of your estimate that it will not be returned to its place in the files.

As of today if you turn over to competent analysts the data on our industry for the past few decades and ask them to predict our future growth, the probability is that those analysts not in any way connected with our industry will produce figures far more optimistic than those that come from our own people. Perhaps we are too close to our own industry to be unbiased. In any event, let us not sell our own industry short.

Many of us in the utility business have been faced with the problem of making commitments for machinery and equipment several years in advance of the time it is estimated the need will arise. Should the need not arise as predicted we are committed to the expenditure of large amounts of capital without revenue derived from its use. If, however, we are fearful of that position we can forego the commitment and trust the need will not arise. If it later develops that we were too conservative our problem then is to supply the demand of the public for energy which we cannot produce. In both of these situations let us assume we had about a 50-50 chance of making the correct decision. In one case we may arouse the ire of our stockholders; and in the other case we certainly will arouse the ill will of the public whose demands cannot be met.

Those of us who are old-timers in the electrical industry can offer to the younger men who are gradually assuming more responsibilities our answer to this problem. The greater of the two evils is that of attempting to explain to the public our inability to keep up with their demands. We should be able to prove to the stockholder that the course selected in the alternative case will eventually be more beneficial to him. We should not forget, either, that failure to meet demand is playing into the hands of those groups who believe, and say, that they are better fitted to serve the public than is private enterprise.

When looking into the near future there is one matter to which we should give some thought, and that is the predicted shortage of engineers. Some years ago our electrical engineering graduates were sufficient in number to satisfy the requirements of manufacturers, utilities and others engaged in the electrical industry. The electrical developments during the last decade have resulted in a large demand for engineers in all branches and types of industry. Just recently I was told that at a well-known university there were more recruiting agents on hand than graduates. Furthermore, it was stated that one of the agents became a recruit.

In view of this situation it will be necessary for us to do a better job of selling our electrical industry to the engineering graduate. We talk to these young men about job security, future possibilities for advancement, pension plans, and other benefits, and do so in good faith; yet our competitors often beat us by talking just one thing—starting pay. We may argue that if an engineer is interested only in starting pay he is the type of employee we will eventually regret hiring. This may be true in some cases, but the problem will become more acute and needs some thought.

As we look inside our electrical industry it appears that we are able to face the future with security and with the knowledge that we will be able to meet any problems we are called upon to solve, even to the production of energy from nuclear fission, provided we are free to run our own several businesses.

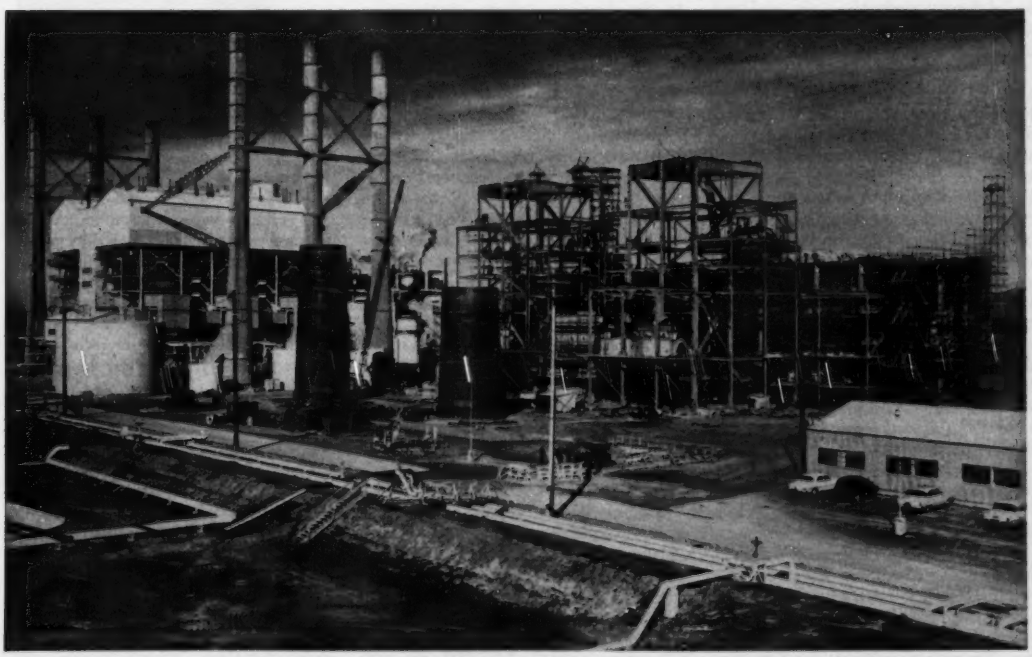
As we look outside our electrical industry we have more cause for concern. During the many years I have been in this industry, it seems we were always viewing with alarm some new aspect of competition by public agencies. Those of us inclined to be optimistic felt these alarms were just another call of "wolf." Now we are again being warned of the dangers ahead, but this time none of us doubts that the danger is real. We are all aware of recent actions by federal agencies, actions that no longer disguise their real purpose. They now have extended their objectives to the point where industries other than electrical are mentioned as being within the scope of their program. This might be advantageous to us in that an increasing number of citizens is awakening to the dangers ahead. The question is "how many and how soon." We in this industry, and all who believe in free enterprise, have a selling job to do. Let us not keep on reselling only our friends. We must sell to the people who need selling. Of course it is a difficult job. It cannot be done between glances at our watches to make sure we do not miss an appointment or meeting. It cannot be done just by argument. It can be by persuasion and the use of time. How else can you change the mind of a person who says something like this: "I like the way things are going. Fifteen years ago I lived in a shack without conveniences of any kind, didn't have gas or electricity, no auto, no radio, not enough good food. Look at me now, I've got a good auto, a radio, a television set, all I want to eat, good pay, a nice house owned by Uncle Sam who rents it to me for only 30 bucks a month. Me change back to the old days? Not a chance."

There are literally millions of people with this same idea; they even credit this phony economy with the inventions and developments that improve our living standards, somewhat like the Russians who lay claim to all inventions from the year one.

We also have many people, who should know differently, who say they are better off today than in prewar days. They have naturally become some years older, the firm they work for has grown, and during this period they have had a series of promotions, let us say from shipping clerk to department manager. They unthinkingly give the present economy credit for the fact that they've grown older, for the concern's growth and for their promotions. There are a surprising number of people in this category. You will find them among your own friends.

It would seem, then, as we look at our electrical industry, or all industry for that matter, from the outside that real problems confront us. We have a job to do that will tax all of our talents and abilities. It is not impossible for us to start the pendulum in the reverse direction, but we must remember also that the return swing takes as long as the upswing.

We have a cooperative industry, one in which the manufacturers, dealers, wholesalers, distributors, contractors and utilities have always worked for its betterment. So long as they continue to do so we will solve our problems. In conclusion I repeat a statement made earlier, "Let's not sell our electrical industry short."



As one step in its expansion program, Pacific Gas and Electric Co. is adding two units at its Moss Landing steam plant. The 235,000-kw addition brings capacity to 575,000 kw. PG and E's Contra Costa plant is being enlarged from 340,000 to 575,000 kw

Even though big expansion programs, material shortages, tight manpower situations and troubles with governmental agencies seem paramount today, JAMES W. CRYDER, RMEL president, says that the whole electrical industry must

TELL AND SELL TO SURVIVE

ANY comprehensive report on the progress and problems of utilities in the Rocky Mountain area must, of necessity, explore five different categories: expansion programs; the effect of the controlled materials plan; cooperation with government agencies; the manpower situation; and pertinent promotional programs. All have a bearing on the present status of the electrial industry and its future development.

Construction and expansion expenditures of electric companies in the area encompassed by the Rocky Mountain Electrical League total more than $25 million. These utilities have installed or are now installing 250,000 kw of new capacity in a planned program of adequate service to the region.

The controlled materials plan has affected these programs to some extent. However, the slowdown has not seriously interfered with the time schedules of most of the major projects.

Grass-roots relationships with government power people in the REA and USBR are favorable on the whole. On the higher levels it is the government policy makers who present most of the obstacles as far as many utilities are concerned.

In this region there is a disturbing shortage of manpower and the decline in the number of engineering graduates from our colleges and universities will add to the pinch. Most companies in the area are experiencing "tight" manpower situations. The defense program and unregulated industries are outbidding the utilities for both skilled and unskilled workers.

Electric companies in the Rocky Mountain region are following the national trend in strongly emphasizing better employee and customer information programs. A new Information Committee met for the first time at the RMEL spring conference for the purpose of discussing interindustry problems. This tangible step finalizes an increasing realization throughout our industry during the past few years that we must carry our story not only to our own employees but to our customers and the public as well.

Sales promotion activity and dealer cooperation programs are being effectively pursued by most of the companies in the Rocky Mountain area. Special campaigns are being carried on to promote particularly those appliances that will build new load or will improve the load factor of individual customers.

Television broadcasting will soon begin in Denver and companies in that service area are looking forward to the load potentials of this new medium of public entertainment. Also they see in television an opportunity for promotional activities to maintain load as well as to promote new electrical appliances and uses.

A detailed look at the expansion programs of companies in this area will show one gage of forward progress. Kingpin of the new power plants is the Arapahoe station of the Public Service Co. of Colorado in Denver, rated at 132,000 kw. This company is also installing a 66,000-kw unit in its Denver Zuni station, formerly known as the LaCombe plant. Public Service has also completed and put on the line a 10,000-kw unit at its Grand Junction steam plant.

Largest single item of the construction program of Southern Colorado Power Co. is the building of the 115-kv tie line between Pueblo and Colorado Springs. Construction of this line started in the early part of February and is progressing satisfactorily, although it has been delayed somewhat due to materials delivery. The tie line will supply Colorado Springs with added capacity next winter.

Mountain States Power Co. at Casper, Wyo., spent $750,000 on new construction during the past year. This figure represents a 40% increase over normal years. Most of the construction sum was put into extensions and additions to distribution systems, transformers, meters, building into new housing projects, reinforcement of existing distribution systems to meet additional loads, enlargement of substations, transformer capacities, and conversion of distribution systems to either higher voltages or construction of ring feeders of higher voltage to feed existing distribution systems at existing voltages.

James W. Cryder, president of the RMEL, is also president of the Colorado Central Power Co.

Home Light and Power Co. of Greeley, Colo., set a new record in constructioin expenditures by spending $500,000. The money was expended for new substation equipment, meters, transformers, poles and wire for new lines.

Colorado Central spent $850,000 on construction during the past year. A total of $550,000 was spent for extending lines, installing transformers, meters and routine replacements, while $250,000 were spent for major system improvements such as new substations, new feeders and voltage regulators to increase capacity and improve service. Nearly $50,000 were spent for new buildings, transportation units and two-way radio equip-

ment. Colorado Central has budgeted nearly $1 million for new construction during 1952.

Public Service Co. of New Mexico has scheduled completion of its No. 1 unit at Person station for 1952. The unit has a capacity of 20,000 kw at an estimated cost of approximately $2,750,000. The company also plans to start on a similar No. 2 unit at the station during the year. Present planned capacity for Person station is 70,000 kw.

The New Mexico company will also construct an Albuquerque service center at an estimated cost of approximately $500,000 and will build several 44-kv transmision lines at an estimated cost of $500,000. An additional cost of approximately $200,000 is expected for switching stations and transformers.

Western Colorado Power Co. spent in 1951 more than $1,100,000 for construction of new electric facilities. Line extensions were run where requested, and at the end of the year more than 98% of the farms in the company service area were electrified.

This detailed look at expansion and development emphasizes the degree to which the utilities of the Rocky Mountains are meeting their responsibilities.

Demands for electric power are so great and so diverse and the rate of growth is so rapid, according to A. S. CUMMINS, president of the Northwest Electric Light and Power Assn., that the electricity-wise public will accept

NO SUBSTITUTE FOR SERVICE

A. S. Cummins, who presides over the destinies of the NWEL&PA, heads California Oregon Power Co.

ELECTRICITY is today an economic necessity so vital to the everyday needs of our people as to demand that its availability be assured at all times for every purpose. Electricity is a commodity for which there is presently no suitable substitute and, as its usage continues to expand, the greater will become its importance. This places a grave responsibility on those charged with the duty of providing electric service. It also poses problems arising from fundamental characteristics of the business, some common to it alone:

1. Electricity must be generated as it is needed; it cannot be produced at a convenient time and stored some place for future use. It is of value only at the point of utilization, and is of value there only if instantly available, continuously, and in the amount required. To the extent that the customer opens or closes his outlets he correspondingly and automatically, without consulting the preference or convenience of the company, accelerates or slows down the generation of electricity at the production centers. Thus it follows that the habits and needs of customers dictate the character of the facilities and the amount of investment necessary to provide that service.

2. The overwhelming preponderance of investment in the electric business is in fixed and immovable physical property and, because of the nature of the business, many times more capital is required to produce a dollar of gross revenue than is needed by either mercantile establishments or manufacturing concerns.

3. The electric business also differs from other types of enterprise in that it has neither the freedom to shut down nor to curtail its services. While operating expenses are to some extent subject to control, the major items of the cost of rendering services are fixed and are not subject to the control of the utility any more than they are susceptible of reduction at the hands of regulatory commissions. It is no more within the power of the utility or the commission to reduce or stay the increase of taxes, or to avoid the necessity of providing for wear and tear and obsolescence of physical property or the necessity of paying good wages and a fair return upon the money invested in property than it is for the utility or the commission to delay or stay the enlargement of plant or facilities when the householder, the farmer, the shopkeeper and the industrialist require increased service.

4. Rates charged for electric services are fixed or approved by, and are at all times subject to the regulation of, state or municipal regulatory bodies which, in most of the states, are commissions or boards especially created and empowered by the state constitution or the state statutes, or both, for that purpose. These commissions likewise regulate the physical service, require that it be adequate and otherwise satisfactory, and that the operating company make such investment from time to time as may be necessary to furnish continuous service to the premises of all users who elect to purchase service.

5. Today's unprecedented demands for service carry with them the need for continued amounts of new capital because, due to the regulated character of this business limiting its right to earn, much of the money required must come from the issuance and sale of corporate securities to the public.

Estimated Construction Budgets of Electric Utilities in the Northwest—1952-1956
Millions of Dollars

	Five Year Constr. Budgets	Generating Plant Construction		
		Five Year Budget	Added Kw	% Kw Increase Over Installed Capacity 12-31-51
B. C. Electric Co.	121.5	50.0	198 800	47.8
Portland General Electric	98.5	64.5	360 000	195
The Calif. Oreg. Power Co.	85.0	53.0	265 000	151
Idaho Power Co.	76.4	46.0	230 000	81
Utah Power & Light Co.	75.0	23.0	162 000	46
Montana Power Co.	47.0	18.5	162 000	35
Washington Water Power Co.	43.2	26.9	230 000	105
Pacific Power & Light Co.	42.0	15.5	108 000	61.5
Puget Sound Power & Light Co.	30.0	...	.....	...
Mountain States Power Co.	21.0	...	.....	...
Calif. Pacific Utilities Co.	6.4	...	.....	...
Telluride Power Co.	1.5	...	.....	...
Tobacco River Power Co.	...(1)	...	.....	...
Totals	647.5	297.4	1 715 800	75.5

Data furnished by officials of above companies during May 1952 as a result of survey conducted by A. S. Cummins, president of the California Oregon Power Co.
(1) In letter dated May 4, 1952, from Tobacco River Power Co., president stated it would, in the five-year period, spend approximately $10,000.

This outside capital cannot be raised and electric service thereby expanded unless a high degree of public confidence exists not only in the ability of management, but in the attitude and thinking of regulatory bodies. The importance of this matter appears such as to justify a re-examination by regulatory bodies of existing traditional rate-fixing policies. In years past, public service commissions measured their achievements by the number and size of rate reductions secured through their efforts. Today their achievements for the public good must be measured by the degree that their efforts and decisions contribute to the financial strength and serviceability of the companies under their supervision. The public can be hurt as much, and maybe more, by denial of increases righteously sought as by permitting continuance of rates higher than are strictly necessary. Management should be freed from rigid limitations and encouraged to proceed with broad all-purpose construction programs.

Of course, there is a practical limit to what can be done but, until such time as that point is reached, we have no right to feel that we have fulfilled our obligation to provide service. In many cases this will mean increases in rates, because some companies that have already doubled their investment in plant during the past five years face the necessity of repeating the process in the period immediately ahead. The impact of the pyramiding of such amounts of new capital on a regulated industry can only be met if earnings can be generated to service the cost.

Demands for electric power are no longer limited even as they were a decade ago. Today they embrace countless new uses, and with man's creative ability and relentless desire for ever better things, the outlook for the future appears limitless. Power and more power must be provided to supply the insatiable demands of an economy constantly striving for improved methods and higher standards of living.

The conclusions seem clear that, as the public grows more and more power conscious, only the ultimate in adequate service will suffice. Power blackouts, shortages and restrictions covering usage will no longer be tolerated. There can be no compromise because there is no substitute. This is a challenge that we in the business must recognize and do something about before it is too late. If it means the building of steam plants in areas where hydro power formerly prevailed, let's build them. If it means extending our services to areas yet considered unprofitable, let's re-examine these situations in the light of today's possibilities. The creation of the REA, the formation of the PUDs and cooperatives, yes, and the advent of, and increasing expansion of the federal government into our respective spheres of influence, is largely related to our failure to provide the services demanded. No longer need groups of people be denied those things considered essential to their well being, and it can be expected that when private agencies fail, public agencies will take over. Remember we face subsidized competition supported by public funds, which is dedicated to the principle of public power.

The fact that actual power shortages exist in some areas and that plant surpluses are insufficient in others doesn't indicate for one minute that the job at hand is too big for private industry. Conditions as we find them today result from the fact that surpluses were largely extinguished during World War II, that materials and supplies have been in short supply since 1946, and that during the past five years there has been an unprecedented demand for electric service. Plants in the past capable of completion in 18 months now require three years. Load growth formerly estimated at 10% annually in many cases have been doubling in a five-year period. Add to these the problems arising from today's high cost and you have the answer to why power supply has not already comfortably overtaken demand.

But the situation differs to a considerable degree throughout the country. It is one thing to add a steam plant in a large concentrated electrified area; it is something else to build a hydro plant miles from the market and have to transport the energy over costly lines to serve needs in widely scattered small communities. For example, in my company's service area, which comprises about 30,000 square miles of connected territory in southern Oregon and northern California, most of the communities are pocketed in various mountain valleys separated by rugged ranges. As this country has grown, the better and more accessible locations were populated first. Each succeeding step in this process of development has found people moving farther and farther out to ever more remote and isolated areas. As our frontier is always the valley over the next range, because we know in serving that new load miles of line difficult to maintain must be built through rugged terrain probably never to be populated, so is our problem intensified.

In spite of this condition, we are constantly moving outward and at the same time picking up remaining pockets of customers in limited areas within the perimeter of our operations. While fundamental economics must dictate the speed and extent to which such programs can proceed, because we in this industry recognize the universal need of electric service, we intend to continue doing everything within our power to make it available to the greatest possible number of people at the earliest moment.

In the Pacific Southwest the Colorado River is the major source of life-giving water. Seven states share its beneficence but two—Arizona and California—says FRANK J. TAYLOR, noted Western writer, are engaged in the

NATION'S NASTIEST WATER FEUD

WEST of Eloy, Arizona, whose rough and ready main stem, Frontier Street, was only a rowdy spot in the desert in 1939, when he migrated from Oklahoma, Cotton Farmer Sam Phillips hit it rich. What made the sandy desert produce so prodigiously — two bales per acre per harvest, nearly four times the yield from cotton fields back home — was water from a well drilled between desert sagebrush, just about the last place anyone would expect to find moisture.

Then, soon after he worked himself out of debt, the well ran dry. Everybody said Sam Phillips was through. Instead, he drilled another hole, 600 ft deep, at the far corner of his farm. Phillips found more water, but this time, instead of a lift of a hundred feet, the new pump had to lift water 350 ft. The underground level had dropped 250 ft in a dozen years. Like any other farmer in the area, Phillips knew his new well and pump, on which he spent $40,000, was pulling water out of the ground a dozen times faster than nature was putting it back.

"This is like putting money on the table in a poker game," he explained, with a pained grin on his wrinkled face. "The time is coming soon when the boys will go and the men will stay."

Over at nearby Casa Grande, larger and older than Eloy, husky John Beggs, another cotton farmer, was faced with the same dilemma, a falling water level underneath his farm. Beggs had just finished lining his irrigation ditches with concrete, to save the one gallon of water lost through seepage out of every three pumped from his wells. Conserving water and lowering his pumps a hundred feet in ten years had postponed his day of reckoning, too.

"We have to get water somewhere, or face disaster in the near future," said Beggs in a matter-of-fact voice.

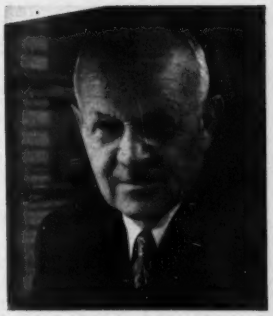
Some of the thirty thousand farmers in central Arizona have already faced up to catastrophe. On the Tucson road, half way between the Phillips' and the Beggs' farms. Leigh La Rue pumped water for 20 years to grow alfalfa for his purebred Guernsey herd. Then his wells ran so low there was barely enough water for the cows to drink. Now La Rue buys feed and spreads it on the desert for the cows to eat, hoping for the day when Providence or Uncle Sam will bring more water from somewhere to revive his dried-up pastures.

"If the rape of our groundwater basins is completed in the next few years through reckless depletion at the present pace of withdrawals, there cannot help but be a profound effect upon the state's economy," Lawrence Mehren, of the Governor's Groundwater Committee, warned Arizonans last December.

"We need water," fervently declares Governor Howard Pyle, the youthful former broadcaster who is the eloquent chief executive of the nation's youngest state. "If we could only get our share from The River, we could be making the greatest per capita contribution of any state to the wealth of the nation."

The River, about which everyone in Arizona speaks as though he were mentioning Santa Claus, is life-giving Colorado, muddy and turbulent above Lake Mead, blue and placid below Hoover Dam, where men have harnessed the prodigious river's energies. The Colorado is a controversial stream over which a cold war has been fought for three decades between parched Arizona and thirsty California. Whether or not a sizable piece of the Colorado should be diverted and lifted, at prodigious public cost, to rescue 225,000 acres of central Arizona's water-short irrigated farm lands before time runs out depends on who wins ultimately in the nation's longest, nastiest waterhole squabble.

In the basement of the Salt River Valley Water Users Assn. in Phoenix,



Frank J. Taylor is one of the country's foremost authorities on the problems and people of the Far West. His writings appear in many national magazines

Manager Rod J. McMullin was explaining how, four generations ago, the rugged individualists who had organized 19 little canal companies finally put away the shotguns with which they patrolled their ditches on horseback, and merged their efforts and resources into an irrigation cooperative. From that beginning had grown one of the country's outstanding reclamation projects, with three sizable dams and reservoirs to capture flood waters and 1,465 miles of canals to irrigate some 10,000 farms totaling 240,000 acres, which produce each year eighty million dollars worth of crops, besides providing the Phoenix area with urban and industrial water.

McMullin brought out an old map of ancient canals traced over the identical area now being irrigated. They were the ditches of the Hohokams — Indian for "People Who Are Gone" — whose 30 pueblos flourished in the Salt River Valley about the time of Christ. This was probably the earliest civilization in the country. Then drouths came, drouths more serious even than the present 11-year dry cycle, which started in 1941 and

as rated as the worst in a century, and the Hohokams were wiped out by the disaster.

"In this kind of country, water is life," concluded McMullin. "If you don't have any, it is the most important thing in the world."

In the State Reclamation Director's office, State Land and Water Commissioner W. W. Lane, who has spent a lifetime studying Arizona's aboveground and underground water resources, explained succinctly why the Arizonans are face to face with an acute water dilemma. Roughly half a million out of Arizona's three-quarter million people live in the Salt River Valley and adjacent areas, which once were prehistoric lakes. Filled in through the ages, the lakes became arid desert, out of which rise the picturesque and rugged buttes that turn shades of lavender and rose in the sunset. Nobody knows as yet how deep these ancient lakes were originally. The Salt River Valley Water Users Assn., which has 250 wells in the area to supplement the reservoir supply and to control the water level by pumping, has drilled one hole down 1,600 ft without striking bottom rock. Near the edges of the valleys well drillers have hit bottom at 100 ft or so. It is here that the farmers' wells are going dry first.

The unseen underground waters flow into the valley and out, just as they flow above ground after the rare rains, according to Lane, only more slowly. The farmers with deep wells can change this natural flow and even dry up their neighbors' wells.

"When you talk about water out here, you are talking about dynamite," said W. W. Pickrell, head of the Salt River Valley Water Users, "but the main thing to remember is that we use the water over and over —three times—and they use it only once."

In Arizona, "they" means the southern Californians. "They are the big, bad wolf that keeps Arizonans from tapping the Colorado, the river that flows so far through or alongside of Arizona that it might well have been called "The Arizona." Isn't the rampaging Colorado's finest sculpturing known as the Grand Canyon of Arizona? Don't the mountains of northern Arizona feed a million acre-feet into the Little Colorado, and don't other Arizona streams contribute to the Colorado's volume?

Ironically, while the Arizona farms thirst for water, from two to ten million acre-feet flow past their state every year and out into the Gulf of California, unused at present. The

Parker Dam on lower Colorado River has capacity of 120,000 kw. USBR photograph

1,400-mile river is one of the world's fabled streams. After funneling in waters from the basins of six Rocky Mountain states — Colorado, Wyoming, Utah, New Mexico, Arizona, and Nevada — and carving mile-deep canyons through the backbones of the Rockies, it empties the floods and countless tons of silt into Mexico's and California's backyards. Through the ages The River built up the delta at the head of the Gulf of California, a hundred miles long and almost as wide, after which it reared new banks and abandoned its own delta, leaving a vast, dry desert area lower than sea level.

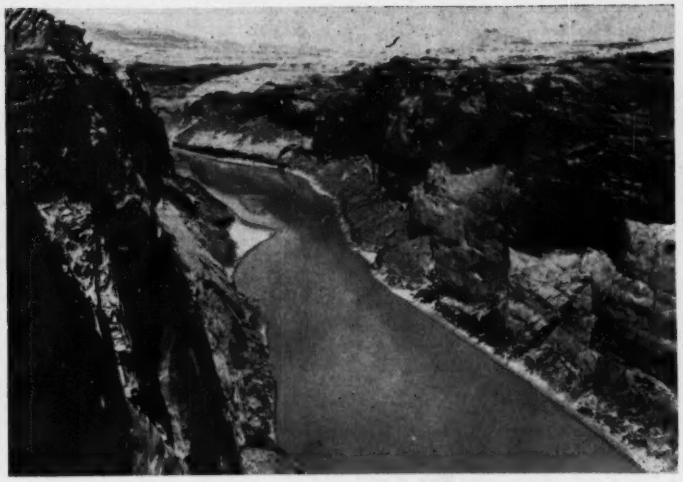
By diverting some of The River's flow, back in the Nineties, daring and sometimes foolhardy pioneers spread water by gravity to this desert and transformed it into the Imperial Valley, a productive half-million-acre winter farming area that for half a century has supplied the country with trainloads of winter vegetables, melons and fruits. This diversion was relatively inexpensive land-making. Even the modern All-American Canal cost only $38,500,000, or $103 per acre, counting distribution ditches.

That diversion set the stage for the cold war for the flood waters of the Colorado. It is still a major obstacle to peace between the states, because the Californians, who got the water first, established prior rights. They have diverted up to four million acre-feet a year for their irrigation projects and even delivered water south of the border for additional acreage. Mexico, as well as seven states, is involved in the big squabble for water. The Imperial Valley could use a lot more of the Colorado's water, if it were available, to water another 250,000 to 300,000 acres of desert still unreclaimed.

The Colorado flows in fearful volume in the late spring and summer, after the Rocky Mountain snows have melted, then tapers off to a comparative trickle for the balance of the year. In the rampaging floods of 1905-06, back before Hoover Dam was built, it broke through its banks and flowed for two years into Imperial Valley, creating the Salton Sea and threatening to turn the thriving new agricultural empire into an inland sea. The River was finally conquered by the heroic efforts of the Southern Pacific engineers after the railroad had been inundated and moved half a dozen times.

Seeking to control these destructive flood waters, and also to store them for year-around use, the Californians pushed upstream far beyond their state borders and filed claims for numerous sites for storage dams, which would also furnish hydroelectric power for their fast-growing cities. The six other states upstream had desert areas they hoped to irrigate, too, and they likewise wanted hydroelectric power for their cities and farms. They filed their claims, and The River's canyons were dotted with so many potential dam sites that a seven-sided shooting war was in the making, a feud with potential thrillers greater than any Western movie director had ever dreamed up.

Hoping to end this chaos, Governor Simon Bamberger of Utah called a meeting of the governors of the seven states early in 1919. They organized



Looking upstream at Glen Canyon dam site on the Colorado River in northern Arizona

The League of the Southwest, and concluded that a pact between the states, dividing The River's waters, was the sensible way to bring peace along the Colorado. This was the first step in evolving what is known now as The Law of The River, which stems from a series of compacts, laws, federal proclamations, contracts, and treaties.

When the governors were unable to agree on division of The River, they asked the United States to step in and help negotiate a compromise and a compact. Herbert Hoover, then Secretary of Commerce, undertook to steer the conferences, extending over two years, in which negotiators from the seven states attempted to divide the Colorado's waters.

When this failed, Hoover hit on the device of dividing The River's basin into two parts at Lee Ferry, a point near the Utah-Arizona boundary, which theoretically separates the upper drainage area from the lower area. From Lee Ferry north, 7,500,000 acre-ft of water were to be the heritage forever of the four Upper Basin states—Utah, New Mexico, Colorado and Wyoming. From Lee Ferry south, 7,500,000 acre-ft, plus an extra million acre-feet claimed by Arizona as compensation for waters already being used by the Arizonans from the Gila River, a tributary that flows into the Colorado near the Mexican border, were to go to the Lower Basin states—Arizona, Nevada and California. Since The River's flow was estimated at well over 20,000 acre-ft, Mexico's needs were to be taken care of out of the unapportioned surplus, and if there were still water to spare, Arizona, Nevada and California could divide that. At the time, there was water enough for everybody — on paper.

This makeshift compact, signed in Santa Fe, N. Mex., in 1922, was the best that could be achieved in the face of human avarice. It became the cornerstone of The Law of The River, and is one of the causes of the 30-year controversy that keeps Arizona and California as far apart today as they were then. Unfortunately, in 1922 when the compact was signed, Arizona was in the midst of a rip-snorting political campaign, won by ex-Governor George W. P. Hunt, a picturesque rabblerouser whose faith was in guns rather than in scraps of paper. Though the outgoing governor, Thomas E. Campbell, had signed the Santa Fe Compact, incoming Governor Hunt refused to honor it, and persuaded the Arizona Legislature to reject it. Finally the U. S. Congress passed the Boulder Canyon Project Act in 1928 which declared the compact in force as soon as ratified by six states, including California, which was required to self-limit its claims to Colorado River water. Arizona refused to sign and has protested the interpretation of the California limitation legislation.

On this disputed cornerstone, The Law of The River was built. The Secretary of the Interior was directed by law to execute contracts allocating water as soon as the four upper basin states and the three lower basin states could agree among themselves as to how their respective halves should be divided. The defiant Arizonans refused to have any part of any agreement. Finally between 1931 and 1934, after years of fruitless effort to get the two states together, Secretary of the Interior Ray Lyman Wilbur signed contracts with various California water-using agencies granting the state 5,362,000 acre-ft a year for the Imperial Valley and two smaller irrigation districts at Palo Verde and Yuma and the Metropolitan Water District and the City of San Diego. At the same time he offered the Arizonans 2,800,000 acre-ft from the storage in a lake soon to be formed by Hoover Dam.

The 700-ft-high Hoover Dam was the key to the whole Colorado River reclamation program at the time. It created vast Lake Mead, which impounded 32,000,000 acre-ft, or a two-year flow of The River, to serve as security against both floods and drouths. Power houses at its base developed over 1,300,000 kw of hydroelectric power, most of it transmitted across the desert to southern California cities. The Secretary allocated 18% of this power to Nevada at the western wing of the dam and 18% to Arizona at the eastern wing. The Nevadans took theirs and developed new industry around Las Vegas. The Arizonans stubbornly refused to sign power as well as water contracts.

Before lending the $149,000,000 needed to build Hoover Dam, with its huge hydroelectric turbines, money being paid back out of the sale of power, Congress inserted a proviso that the spectacular construction job could be started only if all seven states ratified the compact or, failing that, six states including California signed and California agreed to limit its quota of water to 4,400,000 acre-ft, plus half of the unapportioned surplus. The California Legislature promptly passed such a law, thus limiting California's share in perpetuity.

This has grown into a major issue in the cold war, because the contracts signed by Secretary Wilbur apportion the Californians 962,000 additional acre-ft of surplus water to supply the 340-mile Southern California Metropolitan Aqueduct, whose pumps lift water from the lower Colorado 1,617 ft over the mountains to augment the water supply of 44 thirsty cities, San Diego being the most distant. Certain of these cities, such as San Diego and Santa Monica, are now completely dependent upon Colorado River water supplied by the big ditch.

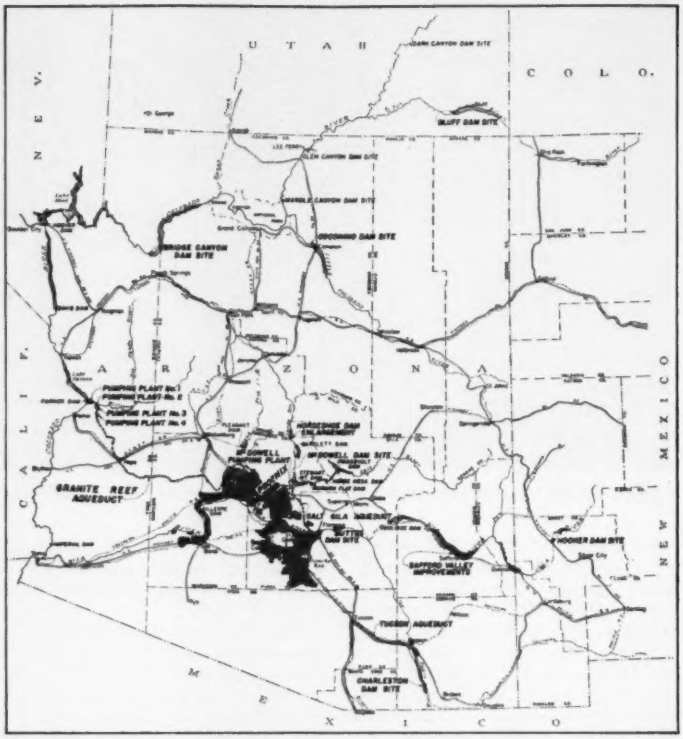
The people in the Metropolitan Water District bonded themselves for $20,000,000 to build this canal, plus several reservoirs, and also Parker Dam on the lower Colorado, where

water is diverted into the aqueduct. The Metropolitan Water District paid for Parker Dam, which, being on a navigable stream, was built and is owned by the federal government. The Californians sold most of their aqueduct bonds to the RFC, whose astute Jesse Jones resold them to private investors at a $13,000,000 profit to the federal treasury.

Angrily protesting that there wasn't any surplus water, Governor B. B. Moeur called out the Arizona National Guard to stop the aqueduct builders from anchoring the eastern end of Parker Dam to the Arizona bank of The River. The Californians completed the dam and the aqueduct anyway. Today it is their turn to holler, because it is from Havasu Lake, formed by Parker Dam, that the Arizonans propose to pump 1,200,000 acre-ft of Colorado River water each year to restore their water levels and save their farms, if the fabulous Central Arizona Project is authorized by Congress.

Before going into the details of this engineering dream, which is almost as Buck Rogerish in scope as anything the Californians ever concocted, two other developments in The Law of The River should be mentioned. One was a 1945 treaty with Mexico, signed just before the United Nations was born in San Francisco, by which the United States guaranteed Mexico 1,500,000 acre-ft of Colorado River water, come what may. The Californians fought this treaty bitterly, contending that the White House and the State Department, in their current enthusiasm for good neighboring, had sold The River short by at least a million acre-feet. The long dry cycle has made honest prophets of them. In some years the flow of The River dropped to less than 5,000,000 acre-ft, and only the vast storage of Lake Mead behind Hoover Dam has averted disaster. Instead of the 20,000,000 acre-ft per year on which the Santa Fe Compact was based, there has been an average per year of only 18,000,000 acre-ft of water available for beneficial consumptive use.

The Californians have a simple solution for this deficit, one that makes the Arizonans boil. The Californians suggest that Arizona include the mythical flow of the Gila River in the computations of the Colorado's flow since that stream is part of The River system. The Arizonans claim the Gila is their stream. The flash floods of the Gila and its tributaries, tumbling out of the mountains of eastern Arizona, are captured behind several dams to irrigate the Salt River Valley farms and provide Phoenix with water. Once the Gila did flow into the Colorado, but in recent times any moisture that escapes the Arizonans' dams or pumps disappears into the desert sands.


U T A H
C O L O.
N E V.
A R I Z O N A
CALIF.
N E W M E X I C O
M E X I C O
GRANITE REEF AQUEDUCT
HOOVER DAM SITE
PARKER DAM SITE
BUCKSKIN MTN. TUNNEL
CHARLESTON DAM SITE

USBR map, Central Arizona Project. Black portions show lands that would be irrigated

How and where to measure The River's water is an even greater bone of contention. The Californians calculate their quota at the point of diversion for beneficial use. The Arizonans want the water measured in The River. Since over a million acre-feet evaporate each year in Lake Mead and other reservoirs, this difference of arithmetic means a lot of water. Only a Solomon or the U. S. Supreme Court can decide whose measuring stick is right.

By 1944 the Arizonans concluded that they were getting nowhere fast by refusing to join their six neighbor states in the Colorado River pact. That year Governor Sidney P. Osborn persuaded the Arizona Legislature to ratify the compact 22 years late.

The Central Arizona Project, by which the Arizonans hope to solve all their water troubles, real and legal, at one swoop, is one for the book. Drafted by the U. S. Reclamation Service engineers after five years of survey, during which alternate schemes involving 80- and 140-mile tunnels through rugged mountain ranges were rejected as too gigantic even for the Paul Bunyans of Western reclamation, the project includes these spectacular features:

A four-stage pumping installation that would lift 1,200,000 acre-ft of water from Lake Havasu, behind Parker Dam (which the southern Californians paid for), 985 ft up to a mesa, from which the water would flow by gravity via a 320-mile canal to the Phoenix area and beyond where 750,000 acres of farm land need more moisture. The part of the project allocated to irrigation will cost approximately $415,000,000 out of a total estimated cost of $788,000,000.

To generate power for the pumps, the project includes a dam at Bridge Canyon, a hundred miles above Hoover Dam. The Bridge Canyon Dam will be higher than Hoover Dam, and eventually the power house could develop 750,000 kw of hydroelectric power. The Arizonans need only a third of this power to run their pumps; so they propose to sell the rest of the power to pay for the entire project.

Cost of the dam and power house and transmission lines will be $404,000,000.

While they are at it, the Arizonans and the U. S. Reclamation Service engineers propose to correct certain other oversights of man and nature in the geography of the Southwest. One of their problems, if the project goes through, is that the muddy Colorado might silt up the Bridge Canyon reservoir, which would have a limited capacity of 3,700,000 acre-ft, in 30 to 50 years, even before the dam is paid for. To avert this disaster, the Reclamation Service engineers propose additional dams on the Little Colorado and San Juan tributaries of the Colorado, whch are great silt carriers. An even more ambitious plan, not included in the project, is a dam at Glen Canyon on the main stream of the Colorado near the Utah-Arizona border, a dam that would create a replica of Lake Mead, capable of storing a two-year flow of water and two-century movement of silt.

The geography remodeling program includes a dam southeast of Tucson to assure that growing desert metropolis an adequate supply of moisture; three dams north and east of Phoenix to store a year's supply of water for the Salt River Valley and the city, in case the power house generators or the pumps break down; diversion canals to feed water to the parched southeastern fringes of the Salt River Valley, where cotton farmers like Sam Phillips and John Beggs and their neighbors are flirting with disaster.

These seemingly unrelated features are wrapped up in one gigantic package, because the Arizonans count on the sale of hydroelectric power to carry the financial load. The package will add up to $788,000,000 at current construction prices, which is more money than Arizona can raise and more than the value of the 750,000 acres of farm lands in the project area. So the Arizonans want Uncle — the U. S. Treasury — to put up the the money, which they somewhat vaguely promise will be paid back within the next 75 years. During those years they ask free power to lift the water from The River to the elevation of their farm lands.

Though that seems a long time to be paying back, the U. S. Reclamation Service has built several projects in other states with 80- to 100-year amortization programs. The United States Senate, after extended hearings, under the prodding of Arizona's able Senator Carl Hayden, voted for the project as a legitimate federal investment. In the House of Representatives, whose committee on interior and insular affairs conducted equally exhaustive hearings, the California delegation has held the bill up in committee, in spite of the efforts of the chairman, who is Arizona Congressman John R. Murdock, to report it out. The irate Arizonans are convinced that if they could get their bill to the floor of the House, it would be passed and their colossal water headache would be almost over.

Almost but not quite. One of the tricky features of H. R. 1500 is that the other states have six months to file suit in the U. S. Supreme Court before work on the Central Arizona Project can start. The Arizonans hope that this will make their controversy with California justifiable, and that the Supreme Court will decide who is entitled to water and how much. Californians disagree completely with this contention. Their representatives in Congress have introduced legislation in the last three sessions to provide for litigation before the Supreme Court. Arizona opposed vigorously.

"Is it necessary to vote an $800,000,000 stratospheric project to make a case for the Supreme Court?" demand the Californians. On the maxim that the best defense is an aggressive offense, they are fighting the Central Arizona Project, which they label fantastic and uneconomic, in congressional committee and in public prints and by radio. The Colorado River Assn., which they have set up for the purpose, maintains a steady barrage of words in the cold war over The River's waters.

The Californians scored when, by resolution of the House Committee on Public Lands, the Secretary of the Interior and the Director of the Budget were asked to calculate for the record the cost with interest of the $778,000,000 project at the end of 75 years. This totaled up to an astronomical $2,075,000,000 burden for U. S. taxpayers, which the Colorado River Assn. astutely spread over a map of the country, apportioning each state its share according to present tax burdens—California's share being $176,000,000, for instance; New York's $304,000,000; Pennsylvania's $158,000,000, and so on.

The Arizonans are asking for a free economic ride, trying to make power pay for their water while the U. S. taxpayer pays the interest on the money for the power plants," says James H. Howard, general counsel of the Colorado River Assn. of the Metropolitan Water District.

The Arizonans have their own Central Valley Project association to counter-propagandize with the story, as they see it. Employing a midwest economic survey service, they came up with their own calculations showing that the project would not only pay its way, but would pour three billion dollars of wealth back into the U. S. Treasury in taxes on earnings from the bumper crops which the farmers will produce during the next 75 years. They, too, have apportioned this among the states, and show that the Californians will gain $160,000,000 by Arizonans' sweat, the New Yorkers $282,000,000, and the Pennsylvanias $146,000,000, during the next three-quarters of a century.

The Californians charge that the Central Arizona Project is a speculators' dream whose principal beneficiaries will be a small group owning vast acreages of newly developed land, and that it will cost up to $3,000 an acre to make this land productive. The Arizonans claim that 30,000 landowners will benefit, at a cost of $400 per acre, and that no new land will be brought under cultivation as a result of the project. They also point out that under the U. S. Reclamation Service 160-acre-per-person limitation, the largest farm any water user and his wife can own is 320 acres. The Californians also contend that the 985-ft lift of water is fantastic engineering when applied to irrigation water. The Arizonans point to the 1,617-ft lift in the Metropolitan Aqueduct, which by coincidence is almost identical otherwise in length and capacity with the one the Arizonans propose to build.

"That's different," reply the Californians. "We are lifting high-priced water for industry and homes for five million people; you propose to lift low-priced water for agriculture and half a million people."

There is little question but that the Colorado's water, diverted to the now densely populated and highly industrialized southern California, would produce more wealth and serve more people. The future-minded southern Californians look ahead to about 1980, when their last gallon of water will have been allocated to the eight millionth resident, and neither sprawling Los Angeles nor any of its seventy satellite cities can grow any more. Whether the southern Californians' date with destiny is any more important than that of the outnumbered Arizonans to the nation's welfare is one of the big issues in the nasty squabble for The River's water. Whoever gets the last word, and the water, gets untold wealth for future generations.

In weighing the relative beneficial uses of the Colorado River's great outpouring of water RAYMOND MATTHEW, chief engineer of California's Colorado River Board, points out that the Pacific Southwest must look to the River as its

LAST GREAT HYDRO POWER SOURCE

THE last substantial source of hydroelectric power potentially available to the Pacific Southwest is the lower Colorado River between Lake Mead and the vicinity of the Arizona-Utah boundary. In this 250-mile canyon section of the river is a fall of about 2,500 ft that can be developed. The present average annual flow is about 12,500,000 acre-ft with about 10,000,000 acre-ft in the critical period 1931-40. This may be reduced by future use of water in the upper Colorado River Basin to an average of about 8,500,000 acre-ft with a minimum of 7,500,000 acre-ft annually.

Thus there exists a huge power potential which under full development would aggregate about 2,500,000 kw in capacity with about 15,000,000,000 kwh in average annual energy output.

Previous Developments

Investigations and planning for development of hydroelectric power on the Colorado River have been under way for 40 or 50 years, both by private and governmental agencies. In the early years, as well as subsequently, the United States Geological Survey took a leading part. One of the early investigators was E. C. LaRue. His first report on the Colorado River and its utilization was published in 1916, W. S. Paper 395. This was followed in 1925 by his classic report on Water Power and Flood Control of the Colorado River, W. S. Paper 556.

The United States Reclamation Service also made extensive investigations. These resulted in another of the classic reports dealing with the development of power and irrigation on the river, the so-called Fall-Davis Report, published in 1922. It was this report that was particularly directed to advancing the proposed Boulder Canyon high dam development in contrast to low dam developments advocated by LaRue. The 1922 report was followed by the Weymouth Report in 1924, which further advanced the proposal for federal construction of a high dam at or near Boulder Canyon.

Prior to and during the Twenties plans for private power development were actively promoted with applications filed under the Federal Power Act. The issues that arose over conflicting proposals were finally resolved in 1928 with the passage of the Boulder Canyon Project Act. The authorization and subsequent construction of Hoover Dam and power plant set the pattern of plans for further development on the lower Colorado River.

Since the building of Hoover Dam there have been two additional power developments completed on the lower river below Hoover, namely the Parker Dam and power plant of 120,000 kw capacity completed in 1943, and the Davis Dam and power plant placed in operation in 1951, with an installed capacity of 225,000 kw. The total capacity of hydro plants already built, including Hoover with an ultimate installed capacity of 1,327,500 kw aggregates 1,672,000 kw.

Potential Development

There remains to be developed for the Pacific Southwest the hugh power potential between Lake Mead and approximately the Arizona-Utah boundary. According to the most recent plans of the U. S. Bureau of Reclamation, the power potentialities in this section of the river would be developed in four projects as shown on accompanying map and profile. These would comprise the Glen Canyon Dam and power plant, the Marble Canyon Dam and power plant, Kanab Creek tunnel and power plant, and Bridge Canyon Dam and power plant. The presently proposed installed capacity and estimated average annual energy output of each of these plants are set forth in Table I.

Raymond Matthew is chief engineer of the Colorado River Board of California, a noted engineer and an expert on the history and potentials of the River

The principal market area for the potential hydroelectric power on the lower Colorado River, designated herein the Pacific Southwest, comprises the entire state of Arizona, southern Nevada and southern California. According to a power market survey report issued by the Federal Power Commission in 1950, the load demands in this area increased during the period 1940 to 1948, 1,447,900 kw in demand and 8,070,700,000 kwh in energy output. In southern California alone the increase in this period was 1,164,500 kw in peak demand and 6,426,600,000 kwh in energy output; in Arizona, 200,700 kw and 1,024,300,000 kwh; and in southern Nevada, 82,700 kw and 619,800,000 kwh.

As of 1952 the total load in the Pacific Southwest is estimated at about 4,100,000 kw in peak demand and a corresponding energy load of about 22 billion kwh; and for southern California alone, about 3,400,000 kw in peak demand and 18 billion kwh in energy output.

According to estimates by the Federal Power Commission, in the report

above referred to, power demands of the Pacific Southwest will continue to increase during the next 20 years at an average rate per year of 205,000 kw demand and 1,060,000,000 kwh in energy output; and for southern California alone, 193,000 kw demand and 910,000,000 kwh in energy.

All of the hydro power thus far developed on the lower Colorado has been fully absorbed in the market. The 4⅓ billion kwh of Hoover firm power and all available secondary were fully used by 1943. The half billion kwh of Parker hydro were absorbed almost immediately after it went into operation. The most recent Davis Dam hydro power was all disposed of by contract even before operation started and is all in use at the present time.

In order to meet the demands in the Pacific Southwest, the utilities have had to install hugh amounts of steam-electric capacity. Since 1945 there have been built and placed in operation 898,000 kw of steam-electric capacity; 771,500 kw of capacity in southern California alone. In addition there are already planned for installation by the end of 1954 1,325,000 kw of steam-electric capacity, of which 1,085,000 kw will be in southern California. These figures are name-plate ratings. Actual operating capacities may be 10 to 25% greater.

From the foregoing appraisal of the power market, it is clear that all of the hydroelectric power remaining to be developed on the lower Colorado River could readily be absorbed. In fact a substantial portion, practically the entire output of Bridge Canyon and Glen Canyon, could have been used in the market area during the last 10 years. Its availability would have avoided the necessity of building a considerable part of the steam-electric capacity that has had to be installed in order to meet the power demands. It also would have resulted in a large saving of fuel oil. The 15 billion kwh a year of potential hydro energy represents from 25 to 30 million bbl of fuel oil to produce the equivalent amount of energy in steam-electric plants.

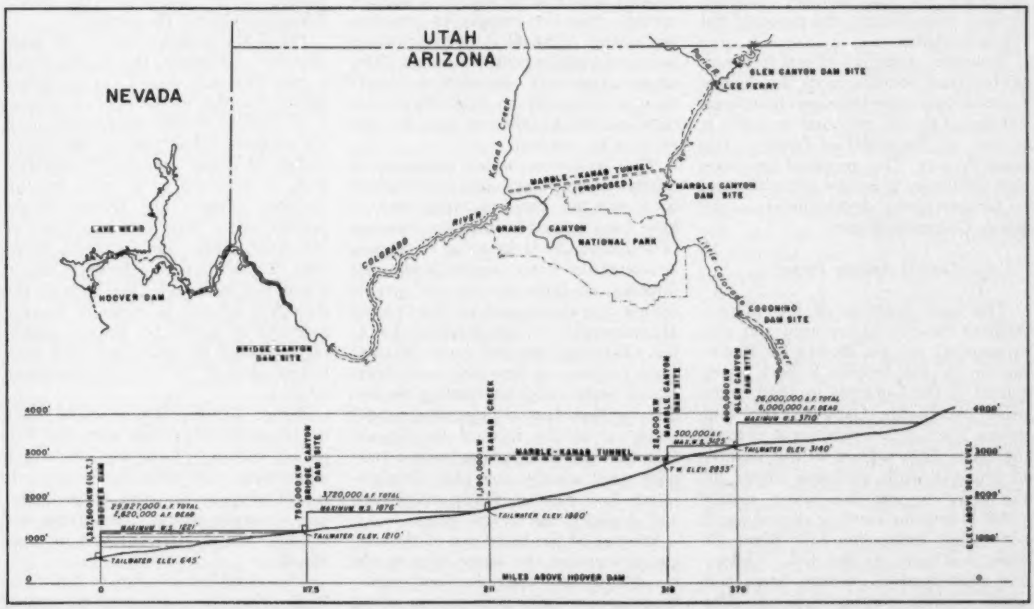
The question naturally arises: "Why haven't these power projects been built, in view of the great need for additional power in the Pacific Southwest?"

There have been numerous obstacles causing delay; some physical, some financial and some political.

In the first place, the State of Arizona has sought to maintain the position that the power resources in this section of the river within the State of Arizona belong to that state and hence should be developed, used and controlled for her primary benefit. In line with this position Arizona filed an application in the Thirties with the Federal Power Commission for a permit to develop the Bridge Canyon Project. The proposal was opposed by the other basin states and particularly by the Department of the Interior, on the ground that Bridge Canyon and other potential power projects on the Colorado should be developed for the benefit and use of the entire

Table I

Plant	Gross Reservoir Capacity (Acre-Ft)	Power Plant Installed Capacity (kw)	Estimated Average Annual Energy Output First 50 Years (Millions of kwh)
Glen Canyon	26,000,000	800,000	3,750
Marble Canyon	500,000	22,000	150
Kanab Creek	.....	1,100,000	6,750
Bridge Canyon	3,720,000	750,000	4,400
TOTALS	30,220,000	2,672,000	15,050



Suggested development of the lower Colorado River to secure maximum hydroelectric power from that source for the Southwest

Artist's sketch of Bridge Canyon Dam, a key feature of the U. S. Bureau of Reclamation's proposed Central Arizona Project

region, and should be constructed and operated by the federal government in accordance with the precedent established by the Boulder Canyon Project. Accordingly, the proposal did not materialize.

However, Arziona's efforts to secure preferential benefits from the Bridge Canyon power development have been continued by the proposal to make it a part of the so-called Central Arizona Project. This proposal has been and continues to be the main obstacle to further power development on the lower Colorado River.

Central Arizona Project

The main features of the Central Arizona Project, as reported and recommended by the Bureau of Reclamation in the Project Report transmitted to the Congress in 1948, comprise the Bridge Canyon Dam and power plant, a 241-mile canal extending from Parker Dam to the vicinity of Phoenix, with pumping plants on the river to lift the water nearly 1,000 ft into the canal, a second canal continuing from the Salt River 74 miles southerly to the Gila Valley; and miscellaneous storage dams and works within central Arizona. The cost of the project as estimated by the bureau in 1951 would be $788,265,000.

The stated main objective of the project would be to furnish a supplemental irrigation supply to preserve or "rescue" 225,000 acres of presently irrigated lands in central Arizona. The construction cost allocated to irrigation is estimated at $450,000,000 or substantially $2,000 per acre on the area to be rescued.

The irrigation water shortage in central Arizona, although accentuated in recent dry years, is recognized to have been caused by overdevelopment of irrigated lands in areas of known deficiency in water supply, under the impetus of large speculative profits during and subsequent to World War II, particularly in the growing of cotton. Between 200,000 and 300,000 acres or more of new land have been placed under irrigation during the last decade. New land development is still going on in the face of the known fact that the underground water supplies used chiefly for new developments have been seriously overdrawn and depleted for several years.

Because of the huge cost of the irrigation features, the water users would be able to pay operation and maintenance costs only and, consequently, the repayment of the $450,000,000 construction cost would have to be met from other sources. This is where the proposal by Arizona to include Bridge Canyon as a part of the undertaking comes into the picture.

From the standpoint of its main objective, irrigation, the reason stated in the bureau's report for including Bridge Canyon in the over-all project is to furnish electric energy for project pumping. One-third of the annual output of Bridge, about 1,500,000,000 kwh, is proposed to be used for this purpose, without any charge to the project water users for repayment of the construction cost involved. However, it is obvious that Bridge Canyon would not have to be tied in with the irrigation scheme in order to become a source of power for project pumping. It could be authorized and built independent of the proposed irrigation project.

Bridge Canyon Dam would have no physical connection with the irrigation features of the project, which would begin 275 miles downstream. It would conserve no water. The project water supply would come from the storage behind Hoover Dam in Lake Mead.

The chief reason for inclusion of Bridge Canyon in the over-all project is to secure power revenues to finance

the entire cost of the irrigation undertaking as well as the power features.

In order to obtain the amount of revenue required for the irrigation subsidy, it is proposed by the bureau to sell the energy output available for commercial disposal, two-thirds of the total, at a higher price than would be required if Bridge Canyon were developed as a separate power project. The excess price the power users would have to bear for this purpose would be at least 0.6 and quite possibly as much as 1.0 mill per kwh.

But that would provide only a part of the irrigation subsidy. The major portion would come from the bureau's proposed use of the 3% interest, "the interest component," on power investment, included in power rates and collected in power revenues. This would amount to 2 mills or more per kwh in the power rate. Thus, the total subsidy would be about 2.5 to 3 mills per kwh, out of a total rate of 5.2 to 5.5 mills per kwh at load center.

The interest component subsidy would be at the expense of the nation's taxpayers. In June 1950, the Secretary of the Interior reported to the House Committee on Interior and Insular Affairs that the cost of interest alone to the nation's taxpayers for the Central Arizona Project, over a 75-year repayment period, would be in excess of $2,000,000,000.

The proposed project is by far the most costly single reclamation undertaking ever conceived or submitted to the Congress. Its extravagant cost has caused people all over the country to begin questioning such huge expenditures for Western reclamation.

The Bureau of the Budget reported on Feb. 4, 1949, that authorization of the project is not in accord with the President's program. Bills to authorize the project, which have been pending in the Congress each session since 1947, have thus far failed of passage. The Senate has twice approved a bill for authorization but the House Interior and Insular Affairs Committee has so far refused to approve the legislation. Thus, Arizona's insistence on including Bridge Canyon development in an infeasible irrigation undertaking continues to prevent the consummation of the Bridge Canyon development as a power project.

Kanab Project

One of the serious obstacles confronting the Kanab Project is the interference with and possible adverse effects on the Grand Canyon National Park. The project is opposed by the National Park Service as well as conservationists in general, because of the proposal to divert the bulk of the river flow out of the canyon, which they believe would be seriously detrimental.

However, the relatively high cost of this project, resulting in a cost of energy, according to preliminary estimates, substantially exceeding present costs of steam-electric power, may long delay or possibly preclude this development being undertaken.

Glen Canyon Project

The Glen Canyon Project, the farthest upstream power project potentially available to the Pacific Southwest, has been beset by various obstacles. Only recently were explorations concluded by the Bureau of Reclamation, during which several alternate sites were explored, and a site finally selected and preliminary plans for the dam and power plant completed.

Perhaps the main obstacle that has contributed to delay and may still further delay the consummation of the Glen Canyon Project is the position taken by the Upper Basin states that this project should be built as an integral part of the upper Colorado River Basin development and for the primary benefit of the Upper Basin states and other projects proposed therein.

Glen Ganyon Dam is essential ultimately to the Upper Basin in order to provide the required holdover storage to furnish the minimum deliveries of water to the Lower Basin under the provisions of the Colorado River Compact. However, the Upper Basin states want the project included as an integral part of the Upper Basin storage development for the purpose of using power revenues therefrom, including the interest component thereof, to subsidize other more costly storage and power projects and also irrigation projects proposed in the Upper Basin.

It is further proposed that the Upper Basin shall have preferential use of the power output. A bill, S. 3013, recently introduced provides, in effect, that any contracts for sale of power outside the Upper Basin shall be on a temporary basis and subject to cancellation.

This proposal is unrealistic, in that it fails to recognize the obvious fact that the natural market for Glen Canyon power is in the Lower Basin, the Pacific Southwest, and that in fact the Pacific Southwest offers practically the only market for this power for many years to come, particularly if other power projects proposed in the Upper Basin are built in the near future.

It is hardly reasonable to expect that any of the agencies in the Pacific Southwest, Lower Basin, would care to enter into any contract for the purchase of electric energy from the Glen Canyon Project under the terms and conditions proposed in the legislation as introduced.

Such unrealistic planning for the Glen Canyon Project, if continued to be insisted upon by the Upper Basin states, could very possibly delay its consummation indefinitely.

Sound Power Program Needed

The most meritorious power projects remaining to be developed on the lower Colorado River are the Glen Canyon and Bridge Canyon projects. These two projects, if developed on a sound financial basis without the heavy financial burdens required to subsidize other less economic undertakings, would provide about 8,000,000,000 kwh of electric energy annually at fairly reasonable cost for domestic, municipal and industrial use, and contribute large benefits to the region and the nation. This amount of hydroelectric energy would be capable of saving 13 to 16 million bbl of fuel oil annually.

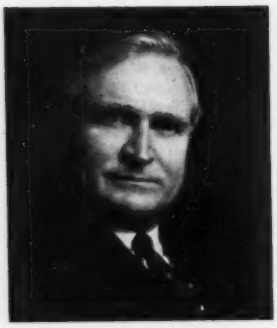
These projects should be authorized and constructed simultaneously. The Bridge Canyon development alone, without the large storage to be provided by Glen Canyon, would be a run-of-the-river plant, with less than half the average energy output firm. Furthermore, even with the Coconino reservoir constructed for sediment control on the tributary Little Colorado River, the sediment inflow would be sufficient to fill Bridge reservoir to the upper power outlet in about 25 years and to spillway level in 28 years. The large storage in Glen Canyon reservoir is needed not only to equalize the river flow and obtain the full amount of firm output at Bridge Canyon but also to provide necessary sediment control to protect the reservoir and power plant.

All of the Pacific Southwest states, Arizona, Nevada and California, are vitally interested in the consummation of a financially sound power development on the lower Colorado River, which would provide hydroelectric power at reasonable cost and enhance the possibilities of commercial and industrial expansion.

In view of the mutual interests and benefits to be derived, it is to be hoped that such a power development program can be agreed upon and brought to early realization.

Having been one of the first industries to be subjected to the drive for collectivism, the electric utilities may become complacent. As an antidote, W. C. MULLENDORE, Southern California Edison president, warns that we can never forget that we are in the forefront in

THE STRUGGLE FOR POWER*



W. C. Mullendore, Southern California Edison Co. president, has issued many warnings about the dangers of collectivism. This is, perhaps, his strongest and best

WE of the electric industry, and particularly the management of the electric utilities, were one of the first groups to be alerted to the fact that the forces of collectivism were on the march. We were alerted because some of the first skirmishes and probing attacks against the institutions of freedom were on our sector of the front. We did not then know that the attack upon citizen-owned electric companies was but a prelude to a general attack upon all the institutions of freedom within the United States.

Certainly few, if any, would have predicted in 1927 that within 25 years American ideals of freedom and individual independence would be replaced by the collectivist ideal of group living in and through government; and that not only the political and governmental, but most of the economic and cultural institutions of our country would, by 1952, be so thoroughly infiltrated that the whole of American life would revolve around the policy-makers and planners of the executive branch of the federal government.

The grand design of the power-seekers, as now clearly revealed, was to concentrate absolute power in an "elite" leadership group in control of the executive department of the federal government. While this grand design has now been largely implemented in our national life, and in our limitless international commitments and involvements, the vast majority of the people of the United States are blissfully unaware of the design or its significance. Indeed there is alarming, if not overwhelming, evidence that even the business leaders are unaware that, while they were kept busy with the production, economic and political battles directly affecting their industries, the main forces of the enemy outflanked them, and occupied the very heart of the citadel of freedom.

For example, we in the electric utilities still tend to act as though we believed that government ownership in our field is the greatest threat, not only to our industry, but to the country as a whole. The fact is that, while we have been fighting our battle against government ownership, the struggle of the collectivists to gain control, of which our battle was a small part, the war to retain our freedom not as managers of utilities but as citizens has been lost. This means that the great task before us now is not that of protecting our freedom but of regaining and restoring it; that we are no longer citizens, but we have been transformed into subjects of an all-powerful government, which, through powers obtained by violating the Constitution in the name of welfare and reform, and under the cover of war and national defense, is now exercising the power to direct and control our life, liberty and property. The form of limited constitutional government in part remains; but the substance has largely disappeared.

And may I, at this point, ask that you withhold your condemnation of the writer as a pessimist and a defeatist—at least until you have heard the case. Too frequently during the past 20 years of revolution, warnings and facts that should have been heeded have been thrust aside and ignored on the theory that facts can be disposed of by classifying them as pessimistic and defeatist. Surely no sensible person would maintain that, if armies of a foreign enemy had already landed on our shores, we could dispose of them by stamping as pessimistic the true reports of the invasion. Well, enemy forces have invaded our shores and are to be found occupying most of the vital institutions of freedom within our country at this moment; and we cannot rid ourselves of these enemies of freedom by refusing to recognize them and by abusing those who call attention to the very unpleasant fact that they are with us—yes, with us and in control of us!

What Has Happened Here?

A few years ago we often heard a question, not now so frequently asked, but still very pertinent. The question was and is "Can it happen here?"—the "it" referring to a revolution in which either through violence or through acquiescence induced by bribery with favors ostensibly bestowed by government, the people would lose their freedom and find themselves enmeshed in the toils of a government of absolute power, exercised either by a dictator or by a bureaucracy. In answer to the question, a few of us who are said to represent the pessimistic viewpoint have maintained for several years that "it has happened here."

With this in mind, let us now recall some fundamental principles, and some highlights of history, over the past half century. We need to remind ourselves that each of us, under the American Plan, is supposed to be a "sovereign citizen." As such sovereign citizens

*Based upon an address before the Southeastern Electrical Exchange, Boca Raton, April 21-23, 1952.

we are charged with a primary responsibility which should come before, which should be higher than and greater than that which we have in any other of life's roles. The fact that we ignore that primary responsibility and tend to devote ourselves almost exclusively to our other concerns, such as those relating to our family, business and recreational life, does not change the fact that, if we as citizens fail to meet our primary responsibility, not only is there no one else to do it for us, but every other interest and achievement in life is thereby jeopardized. Let us, therefore, in this unaccustomed role as sovereign citizens see if we can thus gain a perspective that will reveal the relative importance of some of the outstanding events, emergencies, achievements and failures of the American people.

Man lives in two worlds—the physical and the nonphysical. In making our survey it is important that we keep that basic fact in mind and properly classify the progress, or achievement, or failure therein (the gain or loss), as to whether it occurred in the physical or nonphysical world. Without becoming too profoundly philosophical, we may observe that, so far as man is concerned, the two worlds are interdependent and that the mental, moral and spiritual (i.e., the nonphysical) is the primary world for the human being, because both his successes and failures in the mental, moral and spiritual realm will determine what happens to man in his physical world.

Turning first to the physical world, man today is literally bursting with pride of achievement, and it would take volumes merely to describe what the human being in the electric industry alone has accomplished in the Twentieth Century. In the fields of physics and chemistry, in medicine, in anthropology and archaeology, in astronomy, in the structure of the atom and the relationship between matter and energy, yes, in every field of physical knowledge and discovery, such strides have been made as to eclipse all previous progress in human history. Then in the fields of practical and applied science, in the electric industry, in transportation (the automobile, the airplane), communication (telephone, radio, television, printing and publishing), in the production and preservation and distribution of food, clothing and shelter—in all these and many others the horizon, and height and depth of man's knowledge, his perception and understanding, his mobility and his knowledge of how to control and harness the forces of nature have increased so fast and gone to such lengths that the whole cannot even be summarized, to say nothing of being comprehended, by one human mind.

Now unfortunately, man at this stage of his development lives in and is aware of the physical world to a much greater degree than he is of his other or nonphysical world. He measures his progress by the increase of his physical comforts and conveniences, and he properly takes great pride in his discovery of the means of avoiding hard work, such discomforts as excessive heat and cold, and of conquering other barriers, such as time and space, which heretofore have made his physical life less free and less pleasant.

It is small wonder, therefore, that anyone who dares suggest that this first half of the Twentieth Century has been a period of reaction and of disintegration, in which civilization has lost rather than gained, will be met with shouts of derision and scorn from the American, and probably denied a hearing because of obvious insanity. Particularly in the U.S.A., if he dares try to press his point in debate, he will be drowned in a sea of statistics having to do with the millions of automobiles and telephones, the billions of kilowatt-hours and passenger-miles, the gross national product, gross national income, disposable income, per capita consumption and standard of living, etc., etc.

Probably in such a debate this fellow who denies the indisputable facts of progress will never get a chance to ask questions; but if he should there is one that causes some embarrassment even to the most convinced and impervious optimist, and it might go something like this: "If, as you contend, this is a period of maximum progress and prosperity, and at the same time during the past twelve years you have not liked the wars and threats of war and the wasteful government spending and high taxes, the threats of communism, and trends toward socialism, how does it happen that in those same years there has occurred the biggest expansion and advance in the 'more abundant life,' i.e., in the very things that to you are the indisputable evidences of our progress and prosperity in the U.S.A.?" Without attempting to answer that question now, let us turn to the happenings in the nonphysical world.

Here the happenings are an old story. In every civilization that has risen, flourished and fallen throughout human history, the general course of human conduct has been the same. During the period of growing observance of and obedience to the spiritual and moral laws of human nature, man grew in strength, mental and physical, and in ability voluntarily to cooperate in mutual helpfulness with his fellow man. In such periods his civilization made progress because, and only because, man increasingly complied with the laws which gave him access to and enabled him to contact the Infinite source of constructive and creative forces—much as we in our industry are enabled to connect our customers with, and thus to make available to them, the beneficent use of the enormous force of electricity, so long as we and they comply with the laws governing that great force of nature.

It is the natural law that man can develop and grow in strength and understanding only through his individual effort, in an atmosphere of ordered freedom, which encourages and makes possible voluntary cooperation with all his fellowmen who are similarly motivated and self-controlled. These laws that govern human nature and the observance of which condition man's advancement have been codified many times and have come down to us as the laws of God in the Ten Commandments, and other precepts and teachings of the spiritual leaders of our own and older civilizations. They have also been translated into such basic political documents as our Declaration of Independence and Constitution of the United States.

But in the course of advancement in each civilization, it seems that man reaches a stage where his further progress is challenged by the destructive forces, the reactionary or backward-pulling forces, of his own physical nature. Self-reliance, individual creative effort, the observance of the Golden Rule, these and other prices and conditions of freedom and progress become irksome as compared with a life of effortless ease, or perhaps of adventure and riotous living, which may seem attainable in periods of great physical progress, or which may be offered by power-seeking leaders in a time of crisis. The trait of the human mind that pulls us toward the belief in what we want to believe comes into play, and the crowd, listening to the promises of the "Great Man" and the slanders of the rabble-rouser, abandons the hard highroad of progress, tries the short cut, pursues only the "abundant life" of physical comforts, the "bread and circuses" of the Roman Emperors, the glory and full employment promised by the dictatorships of a Hitler and Mussolini, or the free medicine and redistribu-

The one big task before every American is to awaken the American people to their danger—to the overwhelming crisis which threatens their lives and the lives of their children . . . We must not in a time of crisis neglect that responsibility, even to fight our particular or special battles within and against our industry

tion of wealth of the Welfare States of the Labor-Socialist government in England and the New and Fair Deals in the United States.

And thus it happens that in the very period when unusual abundance of "the good things of life" convince the easily-convinced majorities that progress is at its height, the greatest reaction often is taking place. Hence it is that history tells over and over the same story of the populace happily and insistently destroying and giving away the source of their strength, bestowing their suffrage and other favors upon their destroyers, and thus traveling happily and ever more rapidly toward disaster, at the very time they are convinced that "we never had it so good."

To return from the general to the specific—from the historic periods of civilization to the United States of today — what have we been doing? During the first 110 years of our national existence, individual self-reliance, voluntary cooperation, the free market and freedom of competition were dominant traits in American life. Government was strictly limited in the part it played in our lives. Government existed to protect us from violence and fraud, and to do only those things for us wherein the force of law and coercion are required in order to provide this protection.

The American thought of himself as living his life outside of, and not in and through government. While he spoke of his form of society as a form of government and of his government as a "free government," what those of the older generations meant and understood was that they were free from the interference, the ministrations or guidance of government in their private lives. They lived their lives in and through their homes, their economic activities, their churches and other cultural institutions. Their concern with government was only to keep it in its place, and to see to it that those who administered it were capable of enforcing the necessary laws fairly, uniformly, equally, and impartially. Yes, it is true, as will be at once suggested, that I am describing now only the prevailing or dominant view; because there was always a reactionary minority who now and again yearned for the government to come to their aid in all the phases and particularly in all the cares, burdens and ills of life.

Time does not permit any detailing of the steps by which the dominant attitude toward government, and the stages by which the limitations upon government, changed and changed until we arrived where we are today. The story has been told so often that most of you can at once recall the main backward steps.

Among the first was the beginning of the idea that it was our duty to spread freedom, and our ideas of political institutions for the achievement of freedom, throughout the world, even if we had to resort to war against other nations to do so. The Spanish-American War may or may not have been the beginning of our war against totalitarian aggression throughout the world. In any event, the Spanish-American war brought the first Roosevelt into the presidency, and the beginning of the aggrandizement of Big Government, the "Big Stick" of federal government.

There followed the emergence of three parties, the election of a minority president, and the concurrent emergence of the idea that the federal government should undertake to regulate money and banking and credit, and the trade practices of many businesses. Then, most important of all, in the year 1913 occurred the endowment of the federal government with the power to collect and redistribute the earnings of the people—the adoption of the income tax or Sixteenth Amendent to the Constitution of the United States. With one exception no greater single step toward the loss of freedom of the individual and the concentration in the federal government of absolute power was taken than this one. It included the power to discriminate, to take all the earnings of some citizens and none of others, and thus provided the federal government with a powerful instrument for revolution under the name of reform.

Then came our War to Make the World Safe for Democracy—the first big crusade that not only prepared the way for the second and third, but also was a powerful influence in orienting the mind of the American toward the national government as the one big center in which he lived and around which his life revolved. For the first time in our history, there was established the power of the federal government to conscript an army to fight a war upon foreign soil. And the discharged soldier had established his contact with the federal government and the "right," as he was taught, to rely upon that government for special favors in exchange for his services in the armed forces of the United States. By constitutional amendment also came still more steps toward democracy and away from a republican form of government. Among these were the direct election of United States senators, and the Prohibition Amendment.

Then in the Twenties came the postwar boom and the prohibition era, big and reckless loans to foreign countries, international finance, Federal Reserve regulation of credit. All helped to prepare the way for the Bust of 1929 and the depression, and the election of a master demagogue to the presidency.

With the accession of the second Roosevelt to the presidency the floodgates of reaction against the American Plan of self-reliance and limited government were opened and there swept over the American scene the deluge of collectivism and socialism from the old world. Again, the people stampeded as they had stampeded to bestow powers upon the Caesars in ancient Rome and upon Hitler and Mussolini, and the Socialist government of Great Britain in more recent days. Great gaping holes were driven in the Constitution by a packed Supreme Court. Through misinterpretation of the interstate commerce, the welfare clause, the taxing clauses, and with clever and expert use of the powers to discriminate and to pervert executive taxing and licensing powers, and administrative rules and laws, the new generations of Americans after 1933 came to understand that government in America was everything, and government meant only, or at least primarily, the executive branch of the federal government, with the President as the Great Man.

When by 1939, with unemployment still unsolved, the new system began to falter, and the devotees of big government began to doubt, there came the bold idea which again as

in many previous instances in other lands had been the idea when all else failed. That was the idea of intervention in foreign wars—possibly leading to world leadership and greater glory for the executive branch of the federal government.

I regret that time does not permit further tracing of even the big steps by which we arrived at the present —the time of Perpetual Crisis, of World Leadership, and of course of absolute concentration of power—now, the greatest power of all, the power in the executive branch of government to *involve us in war.*

Where Then Are We Now?

To answer that question summarily and hastily, I want to give you three quotations from recent writings by competent authorities. The first is from Whittaker Chambers in his letter to his children published in the *Saturday Evening Post* as the introductory chapter in Chambers' story of the Hiss Case, "I was a Witness":

"—in this century, within the next decades, will be decided for generations whether all mankind is to become communist, whether the whole world is to become free, or whether, in the struggle, civilization as we know it, is to be completely destroyed or completely changed. It is our fate to live upon that turning point in history.

"The world has reached that turning point by the steep stages of a crisis mounting for generations. Few men are so dull that they do not know that the crisis exists and that it threatens their lives at every point. It is popular to call it a social crisis. It is in fact a total crisis—religious, moral, intellectual, social, political, economic. Communism, which claims to be a solution of the crisis, is itself a symptom and an irritant of the crisis."

The second quotation is from an editorial in the *New York Times* of October 31, 1951, and is as quoted in Garet Garrett's most recent book, *The Rise of Empire:*

". . . the Korean war has brought a great and probably long-lasting change in our history and way of life . . . forcing us to adopt measures which are changing the whole American scene and our relations with the rest of the world . . . We have embarked on a partial mobilization for which about a hundred billion dollars have been already made available. We have been compelled to activate and expand our alliances at an ultimate cost of some twenty-five billion dollars, to press for rearmament of our former enemies and to scatter our own forces at military bases throughout the world. Finally we have been forced not only to retain but to expand the draft and to press for a system of universal military training which will affect the lives of a whole generation. The productive effort and the tax burden resulting from these measures are changing the economic pattern of the land.

"What is not so clearly understood, here or abroad, is that these are no temporary measures for a temporary emergency but rather the beginning of a wholly new military status for the United States, which seems certain to be with us for a long time to come."

Upon that editorial, Garrett has this comment, in part:

"Never before in our history, probably never before in any history, could so dire a forecast have been made in these level tones. But what they are saying is true."

And my third quotation is from Winston Churchill, as quoted in the closing paragraphs of that remarkable book *The Struggle for Europe* by Chester Wilmot:

". . . in Roosevelt's life and by his actions he changed, he altered decisively and permanently the social axis, the moral axis, of mankind by involving the New World inexorably and irrevocably in the fortunes of the Old. His life must therefore be regarded as one of the commanding events in human destiny."

And Mr. Wilmot follows that quotation with his own observation to the effect that these "heavy international burdens" which have been accepted by American people since the war "have devolved upon them largely as a result of the political and military mistakes of their wartime leaders, and especially Roosevelt, Marshall and Eisenhower . . ."

Again let us ask, in the light of the trends and events within our country during the past 50 years and the acceleration thereof during the past 20, and in view of our place and our responsibility in the international scene as indicated in the quotations last above, where are we now? We are in the grip of an all-powerful government, and that government, and consequently the whole American people, are now involved in world-wide evil and destructive forces which threaten to enslave if not destroy us.

What Do We Do About It?

I am sure that it has long since occurred to you to ask: Well, Mr. Writer, just what do all these cosmic forces and revolutions and crises have to do with the current problems of the electric utilities and their managers? My answer is that this situation which I have inadequately described, but to which I hope that I have at least challenged your attention, has everything to do with us, because:

Our life and our business is only a part of the greater whole. The foundations, the entire security, the whole of our big problems and of our opportunity for survival, are bound up with the extrication of the people of the United States from this concentration of power in government and the total enslavement of the individual which is involved therein.

Above all, I wanted to try to make clear why the threat of government ownership of the electric utilities should be a matter of *relatively* small concern even to those of us who are managers of those utilities. I do not mean that we should not continue strenuously to fight government ownership of the electric utilities, but only that this should not be our principal concern. In a crisis in which a man's life is immediately threatened, he does not continue to give his principal attention to the performance even of an important part of his daily work. He first wants to make sure that he is going to be here to continue in that work.

If we could make our principal contribution to the great task before us of restoring liberty and extricating the government of the United States from the impossible mess in which its foolish leaders in the last war involved us—if we could make such contribution by devoting our principal attention to the threats of government ownership of the utilities—that is what we should do.

I submit, however, that the one big task before every American is to awaken the American people to their danger—to the overwhelming crisis which threatens their lives and the lives of their children. You are not only leaders in the business world, but you are first and above all, leading citizens of your communities, your state and your nation. We must not in a time of crisis neglect that responsibility, even to fight our particular or special battles within and against our industry.

It is up to us to help awaken our fellow-citizen. It is the people who must be awakened, and made to see the peril. Until they are awakened the politician neither can nor will do anything. Voting is not enough. This is a job for our daily lives—*the one big job.*

The economics of higher voltage transmission is currently a live topic. E. C. STARR, professor of electrical engineering at Oregon State College and consulting engineer, the Bonneville Power Administration, presents here a practical discussion on the economy of

HIGHER TRANSMISSION VOLTAGES

THE ideal transmission facility or system is one that will perform its required functions, in accordance with prescribed standards, at minimum cost for the life of the project. In any specific case the transmission distance is known, and the power requirements together with load growth must be determined. The required performance standards with regard to outages, steady-state and transient stability and voltage control must be established. For some cases, depending upon the nature of the load and the multiplicity of circuits and power sources, momentary outages may be much less important than for others. Stability is ordinarily unimportant when the circuits are short and are of multiple character, or when the line is of the "bulk energy" type serving an area with other sources and reserve. It is, however, of major importance when the circuits are long and serve to connect a principal source of generation to a load area or network.

Transmission Voltage

It is customary to think of voltage requirements in long-distance transmission in terms of line length, an old criterion being one kilowatt per mile. However, high voltage is merely a result of the process employed to obtain an adequately low transfer impedance between generator and load to enable transmission of the power required.

The basic equation for maximum power transmitted between two terminal voltages in its simplified and idealized form is

$$P_m = \frac{E_g E_r}{X_t} \qquad (1)$$

where E_g and E_r are the generator and receiver voltages, respectively, and X_t is the total transfer reactance between these voltages. Overhead circuits, because of their necessarily wide conductor spacing, have relatively high reactances, and hence X_t for a long line, being largely line reactance, is quite high as viewed from the line terminals. Its equivalent value, however, as viewed from generator and receiver voltages, may be greatly reduced by employing transformers, and the maximum power capability is increased proportionally. If both sending and receiving transformers have the same high-to-low voltage ratio, N, equation (1) can be written

$$P_m = \frac{E_g E_r}{(1/N)^2 X_t} \qquad (2)$$

The effect of the transformation is thus evidently to reduce the transfer reactance by the square of the transformation ratio and ideally to increase the maximum power also by the square of the transformation ratio. In the usual case the sending and receiving ratios are not equal, and in that event equation (2) can be written in its more practical approximate form as follows:

$$P_m = \frac{N_g N_r E_g E_r}{X_t} \times 0.75 \qquad (3)$$

where N_g and N_r are the sending and receiving transformation ratios, respectively, and the factor 0.75 allows for a normal amount of circuit resistance and some stability margin.

It is seen from equation (3) that when the generator and load voltages have specific values the maximum power transmittible is proportional to the product of these two voltages and of the two transformation ratios, and is inversely proportional to the total reactance of the high-voltage circuit, including the transformer reactances as viewed from the high-voltage side. Since generation and load voltages are more or less fixed at relatively low values, and since the transfer reactance X_t is relatively unaffected by ordinary line construction, being essentially proportional only to length, the maximum power capability per circuit can be increased most conveniently by increasing the transformer ratios the necessary amounts.

Professor E. C. Starr, Oregon State College, is an authority on series compensation and the economics of high-voltage transmission

This is a somewhat unconventional approach to the classical transmission problem, but is used to point out the vital importance of transformation ratios as they influence maximum power capability. It is obvious also that any operation that will reduce the high-voltage transfer reactance X_t will also proportionately increase the power capability. This may be accomplished by paralleling several circuits, by using series capacitors, or by using multiple-phase conductors, such as the duplex conductors now being used to some extent abroad.

The primary result of high transformation ratios is to reduce the effect of the reactance built into the circuit in inverse proportion to the product of these ratios, but the principal secondary effect is to cause the transmission circuit to operate at high voltage. This high-voltage operation necessitates adequate insulation to prevent equipment failure and line faults, and adequate conductor size to prevent ex-

cessive corona loss and harmful radio influence. The cost of these circuits is in large measure governed by the voltage at which they must be designed to operate, although at the higher levels with the larger conductors this cost is not directly proportional to the voltage.

A further inspection of equation (3) discloses that when very large amounts of power are to be transmitted over relatively short lines that have correspondingly low reactances, large values of transformation ratios and correspondingly high transmission voltages may be necessary. This means then that relatively short lines carrying very large amounts of power must of necessity operate at high voltage unless a multiplicity of circuits at lower voltage is desirable and can be provided. Since circuit length influences the transfer reactance X_t almost directly, it is obvious that when relatively large amounts of power are to be transmitted long distances the transformation ratios must be high. Hence, there will be occasions for short lines operating at very high voltages and longer lines perhaps at lower voltages.

Economic Study

After an adequate number of circuits and an appropriate transmission voltage level have been chosen to accommodate the requirements established by other studies, an economic analysis should follow to determine the best actual operating voltage and conductor size. Such studies must include all fixed and operating costs of the possible alternatives that would meet the capacity and flexibility requirements, and these costs are then best expressed in curves, such as those shown in Fig. 1. In this case the line length involved was 200 miles, and three alternatives were examined. One was a conventional 230-kv circuit using 500,000 cir mils, copper equivalent, ACSR conductors supported by steel towers on an average right-of-way. The second was a 230-kv circuit on the same right-of-way but using conductors having practically 2.5 times the cross-sectional area of the first. The third was a 345-kv circuit on the same right-of-way using the same conductors as the second 230-kv circuit, with adequate insulation and spacing for operation at the higher voltage. Autotransformers were employed at both terminals to integrate the 345-kv circuit with a 230-kv network.

The transmission costs are expressed on a relative basis in order to make them applicable to a wide variety of cost levels and financing plans. One cost unit in this case is the cost per kilowatt-hour of transmitting the surge impedance load (approximately 130,000 kw) at 75% load factor 100 miles over a 230-kv, steel-tower circuit having 500-MCM, copper equivalent, ACSR conductors. It will be seen that the cheapest of the three circuits, that using 500-MCM, copper equivalent, conductors, is the most economical up to peak loadings of approximately 180,000 kw. This load at 200 miles gives a sending-end to receiving-end line-voltage angle of approximately 35 deg, which might be considered the maximum stable value if the circuit terminal impedances were somewhat higher than normal.

When the loading exceeds 180,000 kw per circuit and on up to 280,000 kw, the 230-kv circuit employing the larger conductors is the most economical. However, for loadings above approximately 200,000 kw and for terminals of normal impedance, this circuit would require series-capacitor compensation to attain the heavier more economical loadings.

An interesting point is brought out by the intersection of the two 230-kv curves at approximately 180,000 kw, indicating that when the circuit using the smaller conductor is loaded to its economic maximum, it is no more economical than the circuit using the much larger conductors operating at the same loading. The larger conductors have the advantage of being able to operate with compensation at more than 50% higher loading with a very substantial increase in economy. Obviously, when the higher loadings can be attained and when that much power per circuit can be integrated satisfactorily into a system, the large conductors at the high loadings provide the answer to good economy.

If the system is of such size and character as to be able to tolerate circuit loadings greater than 300,000 kw each, then the 345-kv circuit employing the large conductors, even though the distance is only 200 miles, becomes the most economical. It can be loaded to approximately 350,000 kw when terminal impedances are normal with no series-capacitor compensation, and at that level of loading is more

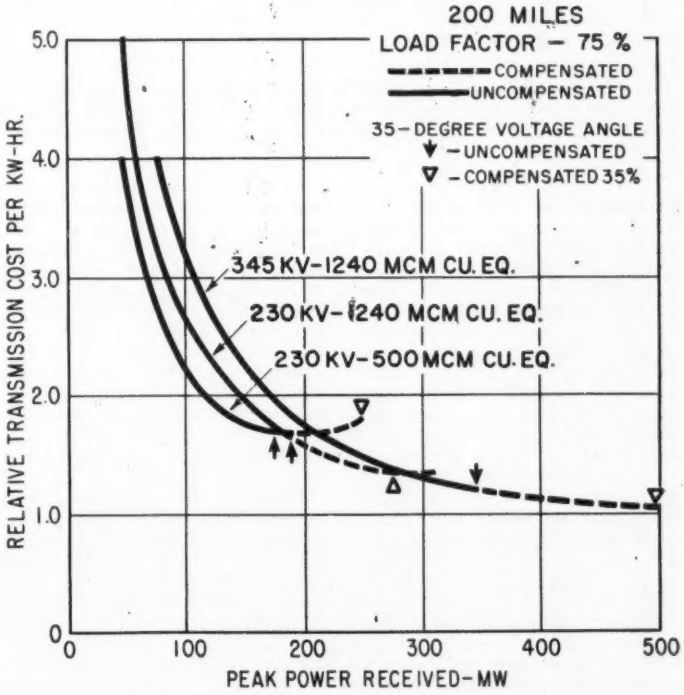


Fig. 1—Transmission cost as affected by voltage, conductor size and series compensation. All transmission cost items included with 230/345-kv autotransformers for 345 kv. No 230-kv transformers. Relative cost base: cost per kwh of 230-kv, 500 MCM copper equivalent 100-mile transmission at surge-impedance loading, 75% factor. Sending voltage, 230 kv; receiving voltage, 220 kv

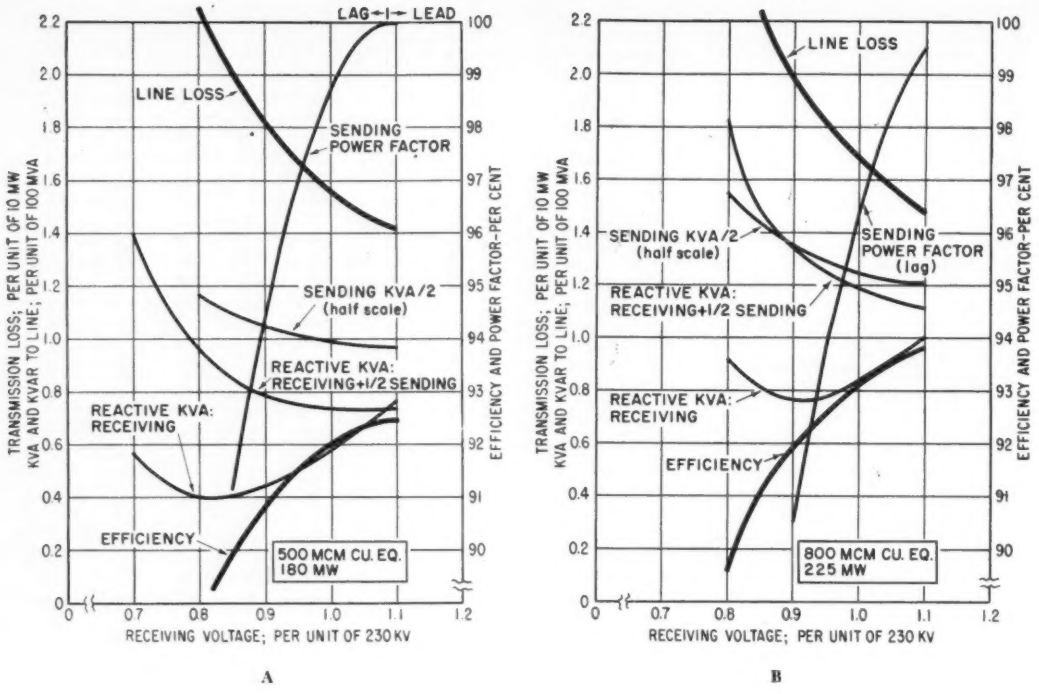

LAG←I→LEAD
LINE LOSS
SENDING POWER FACTOR
SENDING KVA/2 (half scale)
REACTIVE KVA: RECEIVING+1/2 SENDING
REACTIVE KVA: RECEIVING
EFFICIENCY
500 MCM CU. EQ. 180 MW
TRANSMISSION LOSS; PER UNIT OF 10 MW KVA AND KVAR TO LINE; PER UNIT OF 100 MVA
EFFICIENCY AND POWER FACTOR-PER CENT
RECEIVING VOLTAGE; PER UNIT OF 230 KV
A
LINE LOSS
SENDING KVA/2 (half scale)
SENDING POWER FACTOR (lag)
REACTIVE KVA: RECEIVING+1/2 SENDING
REACTIVE KVA: RECEIVING
EFFICIENCY
800 MCM CU. EQ. 225 MW
TRANSMISSION LOSS; PER UNIT OF 10 MW KVA AND KVAR TO LINE; PER UNIT OF 100 MVA
EFFICIENCY AND POWER FACTOR-PER CENT
RECEIVING VOLTAGE; PER UNIT OF 230 KV
B

Fig. 2—Transmission economy as affected by receiver voltage. Line: 175 mile, 230-kv construction. Sending voltage: 1.05x230=242 kv. No sending transformer. A—conductor: 500 MCM cu equiv ACSR. Received power: 180 mw. Receiving transformer: 120 mva, force cooled (S.C. rating). B—conductor: 800 MCM cu equiv ACSR. Received power: 225 mw. Receiving transformer: 150 mva

economical than either of the 230-kv circuits. By using 35% series-capacitor compensation this circuit can carry a peak load of 500,000 kw at a unit cost approximately only 75% of the lowest 230-kv transmission cost.

The ability to integrate such a circuit into a power system at this heavy peak loading is, of course, contingent upon the size and flexibility of the system being such as to enable it to sustain the loss of this circuit and its large amount of power without producing a serious disturbance. If it represents only 15 or 20% of the power to an area, the load network can be designed to sustain this loss and take advantage of the high economy of this extra high-voltage, high-load transmission.

In every case it is obvious that best economy is obtained only by relatively heavy circuit loadings, and these loads of maximum economy for the various voltages and conductors chosen are relatively independent of line length, although this factor does have a minor influence on the relative positions of the curves and on their individual loads of maximum economy. Lower voltage lines give cost curves lying to the left of the three shown but crossing over to the right at progressively higher cost levels as the voltages are decreased. This indicates that for small amounts of power greatest economy would be served by lower voltages, but that the unit cost in turn would be relatively very high in comparison with the best values obtainable on the curves shown.

Operating Voltage Level

When the nominal operating voltage class has been chosen by the application of equation (3), or its refined versions, and by a cost study similar to that depicted in Fig. 1, the actual operating voltage levels should be chosen. Equation (3) shows that with fixed generator and load voltages the maximum power capability depends upon the actual transformation ratios chosen. If no interconnection with other circuits at the high-voltage level is contemplated, these ratios are governed only by the voltage class and basic insulation level chosen for the high-voltage equipment. In the interest of obtaining maximum capability it is obvious that these ratios should be such as to operate the system at the upper limit of the voltage class and basic insulation level, provided the protective equipment can be properly coordinated under these conditions.

In the interest of economy minimum basic insulation levels should be used for the high-voltage equipment, and solid grounding of transformer neutrals must be practiced to permit the application of adequate lightning arresters to protect these low insulation levels. Operation at maximum voltage then implies effective control of load-rejection and other momentary dynamic overvoltages to avoid lightning arrester damage, and the solid grounding will prevent overvoltages during ground faults that might otherwise prove destructive to lightning arresters. It is obvious then that if advantage is to be taken of the low basic insulation levels and upper-limit operating voltages, extra precautions must be taken in effecting control of accidental dynamic overvoltages.

In the past it has been customary to operate transmission systems with

sending-end voltages 5% or more higher than receiving-end voltages even though the voltage class of the equipment on both ends of the line is the same. This is a definitely wasteful practice as is brought out by Fig. 2. In Fig. 2-A a typical 230-kv transmission line 175 miles long has been studied. In this case the conductor employed was 500,000 cir mil, copper equivalent, ACSR, and the spacing was normal for that voltage. It was assumed that the power to be received was 180,000 kw, the approximate load of maximum economy for this line, and the sending-end voltage was taken to be 5% above nominal or 242 kv, thus taking advantage of the maximum permissible sending-end transformer ratio in equation (3). It is shown in this figure that the required amount of power can be transmitted at receiving-end voltages as low as 70% of nominal. However, reference to the power loss and efficiency curves will show that operation at this voltage results in high losses and low efficiency.

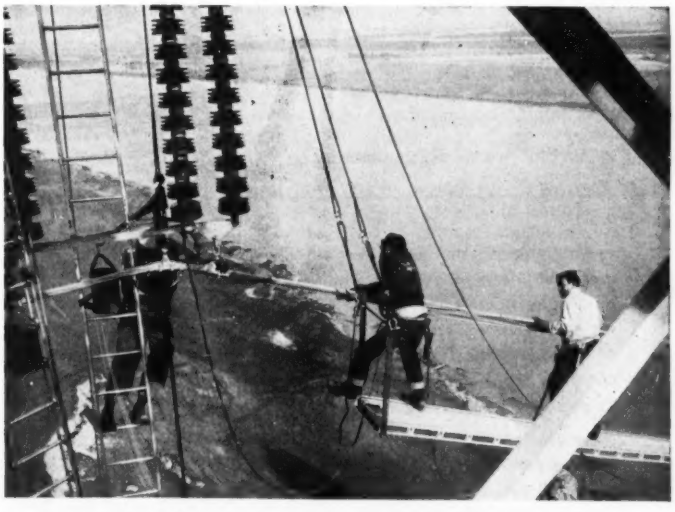
Minimum receiving-end reactive kva supplied to the line is required when the receiving voltage is approximately 85% of nominal, but at this point the losses are still high, and the efficiency is much below maximum. Increasing the receiving-end voltage above this value requires more reactive kva to the receiving end of the line, but releases much more than an equal amount of reactive input to the sending end of the line. The efficiency continues to improve, and the losses continue to decrease when the receiving-end voltage is raised to 10% above the nominal value which is the maximum permissible operating voltage of a +5% tap on the receiving-end transformers.

The sum of sending- and receiving-end reactive kva supplied to the line also continues to decrease up to this maximum voltage. However, sending-end reactive kva, depending upon the amount and power factor of other loads taken from the generating station or the sending point on the system, may be much cheaper than receiving-end reactive kva, and one example of a weighted aggregate reactive kva curve is shown. The full value of receiving-end reactive is added to 50% of the sending-end reactive and is shown as a summation. It will be observed that this curve is relatively flat from 90% to 110% nominal voltage, indicating that if sending-end reactive is only half as costly as receiving-end reactive, the total reactive cost would be essentially the same from 90% to 110% of nominal receiving-end voltage. For this evaluation of reactive, transmission cost would decrease up to the very limit of receiving-end voltage, indicating that even with this relatively small conductor at heavy loading the receiving-end voltage should be maintained at least as high as the sending-end voltage, and therefore that the voltage level throughout the line should be maintained at the maximum permissible value.

Figure 2-B gives the results of an operating economy analysis of a line of the same length as that chosen for the example of Figure 2-A, namely, 175 miles, but the conductor cross section is now 60% larger, or 800,000 cir mil copper equivalent. The received power is increased to 225,000 kw to maintain the maximum-economy loading concept, and the sending-end voltage is again 5% above 230 kv or 242 kv. The continuing increase in transmission efficiency and decrease in losses up to 110% receiving-end voltage is now particularly marked, the efficiency for this large amount of power approaching 94% at 110% receiving-end voltage. Likewise, the sending-end power factor increases from 90.5% lag at 90% receiving voltage to 99.5% lag at 110% voltage. This increase in power factor and decrease in losses result in the marked total kva decrease at the sending end shown by one of the curves. The weighted reactive kva curve also decreases throughout its entire range up to 110% receiving-end voltage, and the change in receiving-end reactive kva from 90% voltage to 110% is much less pronounced than in the case of the smaller conductor. This line obviously operates at its best economy when its receiving-end voltage is at the upper limit.

Summary

This brief analysis may be summarized by pointing out that for transmission lines even of only moderate length best economy is served by alternately increasing conductor size and then voltage class as the transmitted power requirements per circuit increase; and then by operating the adopted facility at the highest permissible voltage for the class chosen at both ends of the line, permitting no appreciable voltage gradient to exist between the sending and receiving ends. This type of operation has the further cost advantage that essentially all the reactive kva needed at the receiving end can be obtained from switched capacitors. Practically no lagging reactive kva will be required to hold the voltage down to the desired operating level under light loading conditions, and minor corrections can be available in load-tap-changing equipment. When the foregoing type of design and principles of operation can be adopted, the economy of transmission in the face of rising material and labor costs can be maintained at a very satisfactory level.



Linemen work at 400-ft level to complete the 230-kv west side transmission line that will carry Central Valley power to Tracy, Calif. This photo was taken from a transmission tower on the west bank of the Sacramento near Rio Vista, as linemen installed protective armor rod. Towers are 437 ft high; carry cables 3,800 ft across the water

Public relations may well be the determining factor in formulating a service policy on major as well as smaller appliances. In the interview that follows J. E. LOISEAU, president of the Public Service Co. of Colorado, tells why

WE SERVICE ALL APPLIANCES

RENDERING a "service over and beyond" is an obligation his company owes its customers, feels John E. Loiseau, president of the Public Service Co. of Colorado. Appliance service is not performed to curry favor or good will alone, although he agrees that public relations might well be a determining factor in deciding upon a servicing policy. Good will is a collateral advantage of a policy that gives the customer a *complete* service. Surveys have indicated that customers value a complete appliance service more highly than they do a rate reduction when it comes to renewing a franchise.

Speaking of "service above and beyond," as he puts it, Loiseau went on to say: "There are thousands of businesses in the make-up of our economic system. These broadly divide themselves into three categories. There are those engaged in production and manufacturing, those engaged in the distribution of the finished product and those engaged in supplying many forms of service. It is in this latter category that we find our gas and electric business, along with a widely diversified group of organizations and professions.

"The service group differentiates itself from the others in that the individual plays a most important part. Most of its functions involve personal contacts and, consequently, the human element is evaluated along with the physical in determining the completeness of the service.

"For example, it's the human touch and the personal interest that make hotel and public dining service complete and really appreciated. Knowing this, are we doing everything possible to incorporate this concept into the gas and electric service we render? In other words, are we rendering a service 'above and beyond the call of duty'?

"Basically, we have completely discharged our service responsibility when we make gas and electricity continuously available at the meter. Beyond this point, the customer is responsible for the piping, the wiring and the gas and electric appliances installed on his premises. Their proper operation and maintenance always present problems.

"Being cognizant of this and realizing that gas and electricity cannot fully accomplish their intended purpose without full utilization through modern appliances, our company maintains complete customer service departments staffed with skilled and trained personnel who respond promptly to customer requests for assistance.

"Letters are being continually received from customers commending the personnel of our organizatiton for the capable and courteous manner in which assistance is being given in the solution of their various gas and electric problems. Performance meriting such commendation constitutes the 'above and beyond the call of duty,' which is essential in rendering a complete and satisfactory service."

John E. Loiseau, president of the Public Service Co. of Colorado, is a staunch believer in rendering a complete customer service

Appliance service policy varies as between major utilities of the West. Many power companies no longer service even ranges and water heaters, having turned all service work over to dealers or service agencies. The Portland General Electric Co. is one of these. In this issue, James H. Polhemus, president of that company, tells why it went out of the service business and what its experience has been.

Several large utilities in the West continue to render a complete customer service. The Public Service Co. of Colorado is one of the latter, and Electrical West presents here results of an interview with President John E. Loiseau on the service policy of that company.

Statement of Electric Policy

Asked to spell out the specific policy of Public Service Co. of Colorado with respect to electric service, Loiseau said:

"First, I think I should make clear our electric merchandising policy. We are not engaged in the selling of electric appliances on a load-building basis but confine our sales to appliances that are still in the promotional stage. This is tied in closely with our extensive promotional activities.

It is the policy of the company to follow through with our service to

and including the actual utilization of the electric energy. While this applies to all classes of customers, it is the domestic customer who requires more physical assistance. The service rendered commercial and industrial customers is primarily advisory and technical.

"Where specific service organizations are maintained by manufacturers, or their local representatives, their services are fully utilized and customers are usually referred to them if major repairs are required. There naturally are many appliances not covered by such specific service organizations and it is in this field primarily that our men render service. They are trained to repair practically any make of appliances and cover the entire field, dependent of course on their ability to secure parts. No attempt is made to solicit this business from any other service organization in our territory.

"For all work performed by the company, on customer's premises, no charge is made for service if it involves only a short time, such as appliance adjustments or minor repairs. Where materials are involved or where considerable time is consumed a reasonable charge is made by the company. Repair departments for small appliances are maintained in the company's central offices.

"The company conducts many training courses and when these are in conjunction with the adult education department of the public schools, the servicemen of dealers and servicing agencies participate.

"Even under our very comprehensive service policy," said Loiseau, "there was only one service order executed in 1951 to about every four customers served, including repairs to small appliances brought in by customers.

"With an organization such as ours," he said, "dedicated to a genuine public service, we must continuously strive for that unattainable accomplishment called perfection."

WE SERVICE NO APPLIANCES

Is it good or bad public relations for the electric utility to go out of the appliance servicing business? Circumstances govern, says JAMES H. POLHEMUS, president, Portland General Electric

James H. Polhemus, president of the Portland General Electric Co., is progressive and encourages his organization to try out new ideas

THE utility that conducts an appliance servicing adjunct to its business and subsidizes the costs thereof either fully so that the service is "free" to the customer, or to a partial extent only, does so for a number of presumably legitimate and economically justifiable reasons. Among the most important of these reasons, insofar as the electric utility is concerned, are the necessity to meet or overcome competition from gas or other fuels; the preservation of existing load built up as the result of expensive sales effort, both by keeping appliances in good repair so that they continue to consume current and also by creating customer satisfactions that give the utility an "edge" on the replacement market; and the maintenance of good public relations.

The judgment any utility would make concerning the advisability of setting up an appliance service department, the extent to which its costs would be subsidized, and the need for continuance after an interval of operation, would primarily depend upon the factors enumerated. They are factors that apply differently in the situations faced by different utilities, and no hard and fast rule could be made to fit all cases. The utility will find, too, that its own particular situation does not remain static. It changes as time elapses and the factors applying must be re-examined from time to time.

Consequently, it is emphasized that the conclusions here reached do not necessarily have validity for any particular utility. It is the belief of the writer, however, that they do have validity for the company with which he is identified, Portland General Electric, and it may well be that the situation in the Portland area actually does apply in some other localities. With that possibility in mind, the PGE experience with appliance servicing problem is cited for whatever lessons it may teach.

History of Servicing

PGE commenced setting up its appliance repair departments in various territory divisions coincident with the installation of the first electric ranges and water heaters. It commenced closing these same departments as the saturations of these appliances began to build up to rather high figures percentagewise. The developments in the interim, the changes that took place in the factors previously mentioned that give maintenance of such departments reason, provide the answer to the question posed at the beginning of this article.

At the outset of range and water heater load-building efforts, gas competition was severe. Also, gas as a fuel for cooking and water heating was in virtually complete possession of the market. The customer service policies of the gas utility included free adjustment and repair of gas equipment.

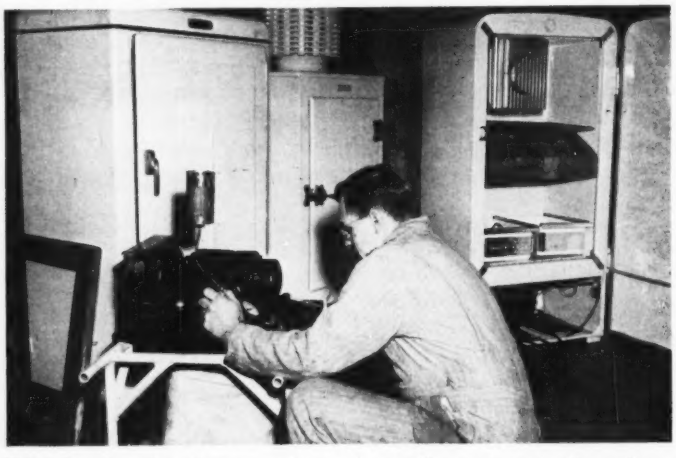
Under this condition of strong competition; of hard, expensive sales effort necessary to move into and upset an established pattern of fuel use; of having to safeguard our load-building investment after it was once made, it would have been silly indeed not to have made an adequate pro-

vision for keeping the major electric equipments sold during this pioneering developmental period operating both in a satisfactory manner for the customer and in a current-consuming and revenue-producing condition for the utility.

Obviously we were, in addition, more than ordinarily anxious to please the early range and water heater purchasers who had listened to the blandishments of the electric company salesmen and had risked their money on unfamiliar, untried gadgets. Public relations certainly was, at that time, one of the prime reasons for setting up appliance repair departments.

There were, of course, no dealers or other organizations able to carry on the repair function efficiently and profitably. The utility on the other hand could, as an adjunct to its general repair department, take on the function and perform it as a free service to the customer with very little additional expense, simply because saturations at the outset were so low that the incremental work load was insignificant.

Electric Home Service Co., Portland, uses efficient routing system for prompt service



This independent shop gives a complete service, handling major and table appliances

Public Relations Aspects

Public relations values of the service during this beginning period were demonstrably positive, as can be well imagined. It is not easy for anyone to hate the donor of skillfully performed, valuable and appreciated service, rendered without charge. And when an activity has a good public relations potential, plus the other tangible, economic values previously mentioned, and at the same time costs the utility a relatively insignificant amount to carry on, it naturally is a "good buy." As a matter of fact, subsidized appliance servicing under a condition of low market saturation can be and undoubtedly is justified by some utilities on the basis of the public relations value alone.

However, under a successful load-building program, saturations grow. As they grow the incremental work load on the subsidized repair operation increases in proportion, and so does the utility's financial burden. As this latter burden grows heavier, the pressure upon management to recapture some of the expense by decreasing the degree of subsidization builds up. Finally the free service policy breaks and charges, modest at first, are assessed to the customer. And because the latter is no longer leading the life to which he has become accustomed, he doesn't like it.

The customer likes it less and less as time goes on and repair service charges go up and up by steps. Nor does it make much difference to the customer that the charge is yet less than it should be to recompense the utility fully for its expense in maintaining the repair service.

PGE at no time operated its appliance repair departments on a self-sustaining basis. It was also PGE's experience that whenever the time comes that departure from the free service policy is being considered it is time to take a very close analytical look at the public relations value of continuing the service.

It is highly probable that the original public relations value of the activity will disappear entirely. More than that, the value is quite likely to become negative, the service may be a producer of *bad* rather than *good* public relations.

Actually, it was largely the insistence of PGE's public relations people on this particular point that motivated the management to effect a gradual withdrawal from the appliance servicing field. In the Portland metropolitan area, where the activity was last to be dispensed with (in 1948), high bill complaints and collection arguments reaching the attention of the customers' service department were averaging seven per day just before appliance repair operations ceased. A much larger number of complaints were being handled directly on the spot by repair department personnel. The complaint frequency, together with other checks, left no doubt that dissatisfactions were being created in

Small electric appliances are repaired in Electric Home Service Co.'s Portland shop

Here serviceman restores a damaged electric water heater by installing a new tank

a large segment of the customers.

PGE's public relations staff employs a principle that it describes with a term borrowed from the medical profession. The term is "ectomy." The public relations "doctors" prescribe an ectomy, a cutting-off, when a business function is diagnosed as infected with the germs of bad public relations and which at the same time, like tonsils, can be snipped without hurting the main function of our business. That function, of course, is supplying kilowatt-hours of electricity and not the repair of equipment that consumes them.

Before such an ectomy is performed, it is positively determined that the proposed surgery is a better solution than attempting to cure the infection itself in some other easier, more economical, less disrupting way. It is also first determined that the function is in fact dispensable. If it is not, a substitute way of performing it must be found, either within or without the utility's own business organism.

In this instance a gradual, step-by-step course of surgery was followed, town by town and division by division. This minimized the shock of transition and gave the healing influence of nature time to operate.

PGE made sure that in each locality there was one or more dealers or electrical contractors who were willing and able to engage in appliance repair, and were as well adequately set up to operate on the necessary scale. Usually the utility was helpful in getting outside operations of this kind started. This was done by turning over utility stocks of repair parts, rigs, customer records, etc. In many cases the utility's trained repair personnel were helped to set up their own business, or they went to work for the dealers or contractors willing to take over the business.

Understandings were reached where possible, in an effort to achieve a reasonable regulation of repair pricing during the transition period. This was done to avoid the possibilities of bad customer reaction inherent in a sudden jump from subsidized to fully compensatory price levels.

To meet this problem, which is somewhat more complex and severe in large metropolitan areas than it is in small towns, a utility contemplating going out of the business may well consider the advisability of subsidizing, for a temporary period until they get on their feet, the replacement operations being set up to fill the gap. It has been PGE's experience that the temporary period should not be unduly long. The pricing level, once pushed to the point of affording in-the-black operations, will bring enough shops into the field to supply adequate personnel and facilities for customer needs.

Utility, Customers Satisfied

The prime requirement of preserving current-consuming load on the customer's premises has been met at this point. The customer also has become accustomed to paying what a repair service to his range or other major appliance is worth. He has long been used to doing this with his automobile, oil burner, radio, the roof of his house, or any other property or equipment that has the common habit of wearing out.

As for utility public relations, if the customer hates anyone because he has to pay what these things are worth, the hate is transferred to someone other than the electric company. Even if in some cases there is dissatisfaction, at least the frustration of having only one place to go is missing from the picture.

PGE recorded only three complaints from customers who felt incensed after its repair service operations in the Portland metropolitan area ceased. The daily list of bill complaints immediately stopped. The utility is not conscious of any movement to have such a service restored, in customer ranks or elsewhere. The utility is continuing to meet and overcome gas competition; is continuing to capture the replacement market; is saving money; and is enjoying *improved* public relations.

ELECTRICAL WEST

To Each His Own

NO matter how sophisticated or blase a person may be, or even how dull a convention may seem, there is a wealth of information to be had from it. In print, as in this issue, the editors cannot bring you the social and entertainment features with which a convention is flavored to relieve its seriousness. But they can bring you notes on the significant things said, the news of trends developing, market opportunities ahead, warnings of dangers in the economic situation and many kinds of useful and valuable information.

In this number the editors present a Convention-in-Print program selected on the basis of highly important subjects affecting the industry, yet not found on the programs of the numerous recent meetings in the industry. These constitute an all-industry forum for thoughtful consideration by all readers.

Also in this issue the editors report to you and for you recent conferences or conventions of engineers, commercial men, contractors, inspectors; a public power convention and two meetings of private power associations. As trained observers and analysts these editors sift from the thousands of words and hundreds of ideas presented those which in their best judgment may interest you, offer you a method or idea you can use, give you information wanted and needed, or tell you a source from which to get it, perhaps from one of the speakers of the program. By experience also they tell you this in concise terms with a minimum of wordage. The reports tell *what* was said; are not merely a listing of *who* spoke.

Thus the conventions and conferences are brought home to the many who could not attend in person. They can learn much from a thoughtful reading of these reports. Moreover the editors will gladly enlarge upon any subject or put a reader in touch with a speaker for more information if but asked. For those who attended but did not take notes, such notes may be found here.

Each issue of this magazine is packed with all the interesting and useful information the editors can cram into its pages. The Convention-in-Print is especially distilled from the grains of knowledge of this potent industry and is very high-proof stuff. Sip it thoughtfully and taste its flavor to the full.

Another Protest Against Bigness

INDICATION of growing concern in public power groups over various aspects of federal power policy was spelled out in several resolutions adopted by the American Public Power Association at its Tacoma convention early last month. Municipalities and public power districts are learning something which investor-owned utilities have long known: bureaucratic big government tends to get omniscient, omnipotent and dictatorial. So the voice of this group is now raised in protest.

One strong resolution concerned the relationship between the federal government and local public agencies. It said that "conflicts have developed, and may continue to develop where the actions of the federal government result in seriously jeopardizing the very existence of public power agencies and impair their ability to render low-cost electric service on an area basis." It resolved that for the "prevention of complete domination by the federal government in the field of the supply and transmission of public power" the U. S. Department of Interior should adopt a power policy which would avoid duplication of facilities and would "avoid restrictions and limitations in contract relationships which tend to centralize control in federal agencies and deny the right of local public agencies to develop their own systems and manage their own affairs."

Many a private power operator who reads this will comment, "We've been saying that for years."

The second resolution registered a strong protest against "the discredit being cast on public power by certain accounting practices" of the USBR. It condemned the "diversion of the interest component as a con-

EDITORIAL VIEWS

cealed subsidy for irrigation in federal projects." In asking that these practices be reformed the APPA points out that the Reclamation Bureau collects "interest as hire for the federal money invested in power" and "actually applies this interest to the retirement of capital which it has invested in irrigation." Instead of paying interest on the national debt, this practice forces federal taxpayers, including the very same power consumers, to "provide the money in taxes to replace the interest which is collected in power rates but which is diverted to subsidize irrigation." And the resolution says further that "no member of the APPA would dare to account for public money in that fashion in the conduct of its business."

Here again the voices of private power operators can be heard to say "We've been castigating the bureaucrats for their phoney accounting for years."

With municipals, PUDs, cooperatives and private utilities in one accord on these two subjects one may hope that Congress too will see the light and change the law.

Happy Birthday

LAST month marked the beginning of a chain of celebrations at irrigation projects throughout the West to honor the 50th birthday of the U. S. Bureau of Reclamation. In the intervening years since 1902 the USBR has become a giant among government bureaus, almost to the point of overshadowing its parent Interior Department. And it has gone far afield from the concepts of its founders who saw it as an agency for reclaiming the arid West for agricultural settlers. Today it is, among other things, the nation's largest power-producing agency and there are those who feel that the irrigation and reclamation aims have been supplanted by power as the principal interest of the bureau. The sponsors of the original Reclamation Act would never recognize their progeny today. However, they would salute it, as do we, for its contributions to the development of the West.

Appliances Need Blood

UNEASY tossing and turning, changing executives, policies, distributors and prices in the appliance business are symptoms of malady. Aspirin doesn't help. If truth be known the business is anemic. It needs blood. It has been living off its fat until that has been burned.

In early days the business grew, nursed by direct-selling utilities which bore much of the sales cost to build load. Since the war it has flourished on pent-up demand that sucked up sales past indifferent salesmanship until that vacuum has now been filled. The way ahead is tough and the business needs strength—which is *profit*. Manufacturers and utilities, both with such stakes in results, need to figure how to give it a transfusion. It is time for a new diet that will nourish this business.

You Can Say That Again

The struggle between liberty and authority is the most conspicuous feature in the portions of history with which we are earliest familiar . . . By liberty was meant protection against the tyranny of political rulers . . . To prevent the weaker members of the community from being preyed upon by innumerable vultures, it was needful that there should be an animal of prey stronger than the rest, commissioned to keep them down. But as the king of vultures would be no less bent upon preying on the flock than any of the minor harpies, it was indispensable to be in a perpetual attitude of defense against his beak and claws. The aim, therefore, of patriots was to set limits to the power which the ruler should be suffered to exercise over the community; and this limitation was what they meant by liberty.—John Stuart Mill in his essay "On Liberty."

Greisser Cummins Gadsby McKee

Robinson Parker

Time to Sell Again, NWEL&P is Told

"Take sales plans out of mothballs and put them back to work," admonished George M. Gadsby, president of EEI and Utah Power & Light Co., at the opening session of the Business Development Section, Northwest Electric Light & Power Assn., Yakima, May 12-14. This sounded the keynote for the entire three-day meeting. Revived interest in selling, merchandising, load building and a keen interest in television marked the occasion.

Section Chairman A. H. Greisser, Portland General Electric Co., called on Paul B. McKee, president, Pacific Power & Light Co., to greet the 175 who attended, despite competition of the NAED annual meeting in Victoria, a record attendance under the circumstances. McKee was optimistic that with the new projects of the private companies and the added government projects soon to come on the line, the tight power situation would soon be relieved. He reminded that the utility is in business to sell in its own market and hence is irrevocably tied up with growth of its area. Its chief function must always be to make its own customers more prosperous.

A. S. Cummins, president, California Oregon Power Co. and of the association, commented on two matters: (1) private companies in the Northwest find that private and public power can exist side by side and that both are working to supply the insatiable demands for more and more power ("If this means steam plants, let's build them"); (2) private companies' construction budget in the Northwest for 1952-56 will add 1,715,800,000 kw, or 75% increase during that period.

Speaking on "Operations—A Free People," Gadsby differentiated between various people's meaning of freedom and recalled that the original concept was that men owed allegiance only to God and the state owes allegiance to the people. He quoted a Morman elder who has said, "Freedom is not bestowed, it is achieved. It is not a gift but a conquest. It does not abide, it must be maintained." He warned that a mere change in administration in Washington would not restore freedom in the government.

As a second part of his talk he brought forth the need for selling in order to keep earnings up so that companies would be able to attract new capital to meet the tremendous expansion expected of them. As a personal opinion, he did not feel that the predicted peak would be attained this year. There are indications of slowing down and it is necessary to work harder to attain revenues. The industry "has been living in a golden haze in which there has been more demand than capacity and growth has come without sales effort." But it has been on the lowest steps of the rate.

Warehouses, he said, are filled with appliances and people aren't buying. Savings are building up. The public is thinking it will be able to buy cheaper. It was significant, he said, that the national television broadcasting of the elections would be sponsored by three major appliance firms, all of which would tell the story of electrical living. His final warning was that if socialism came, advertising and sales would be out of the picture completely.

A panel was called upon to fill the remaining time and the first question raised was whether utility managements were considering going back into direct merchandising. Gadsby said that would have to be determined by each company for itself, but he would regret to see any utility return to merchandising. McKee said his company was making a survey in the Yakima Valley, something it had not done for years, and had employed 30 men to call on all customers and find out what the appliance situation was, in order to be able to stimulate dealer activity. Other questions raised were whether utilities should carry on sales training for dealers and whether DEPA would continue its attitude of discouraging sales activity. It was commented that dealers do not "go across the railroad tracks" to work with the minimum customers and do not cover the rural lines. W. L. Thrailkill reminded that the same situation existed as did two years ago, i.e., manufacturers do not provide enough margins for dealers to hire or train salesmen, but depend too much on the utilities for sales promotion.

Carroll V. Roseberry, Westinghouse Electric Corp., Pittsburgh, gave a manufacturer's view of the future, predicting that the electric utility industry would be selling 612 billion kwh in 1961, or nearly double the amount used in 1951 and would need 156 million kw of installed generating capacity. To prepare for this market, he recommended that utilities plan for larger organizations, map intensive advertising and sales promotion campaigns and install larger generating units to reduce operating and investment costs. He mentioned many new developments in industry that are calling for more power in order to reduce total production costs. Factors that will increase domestic load are the thaw of television broadcasting licenses, a trend toward air conditioning, dishwashers, clothes dryers and freezers and other new home appliances, plus the potential with electric ranges and water heaters, which has hardly been scratched.

"The Hells Canyon Story" was

brought up to date by Earl A. Olson, sales manager, Idaho Power Co., who declared that the issue was clear-cut as to whether the Department of Interior is to have jurisdiction on all the water rights of any river or whether the individuals in a state can retain any rights. He contrasted the intended generating capacity at the single Hells Canyon site as against the total to be developed by Idaho Power Co. at five sites on the river in logical sequence and at great savings to the taxpayers. The people of Idaho, he said, felt strongly that if the federal government developed the site, the industries and people of Idaho would receive very little of the power produced.

A new Washington Water Power Film, *Power On the Way,* showing construction work on the Cabinet Gorge plant, was shown to indicate how utilities can dramatize their construction programs at relatively low cost by producing movies with their own organizations. Clem Stearns, chairman of the advertising and publicity committee, presented it.

A second general session, presided over by Vice-Chairman Carl Hoffman, Washington Water Power Co., brought talks on home lighting, gas competition and commercial cooking.

Mary E. Webber, General Electric residential lighting specialist, spoke on "Home Lighting — If Some of You Remember What That Is." Although the industry has been frustrated, the 25 years of educational work have not been lost, she said, for they have produced a new idea for tackling the home lighting problem — the recipe idea. This provides answers to the problems common to everyday lighting requirements for the things that people do around home. They are not standardized nor are they tied to any specific line of fixtures. Aimed at the middle group of the people, lower groups can get much from the recipes and the upper groups can benefit by using them also. Nor does it require a corps of lighting advisors. She then told how it reflects in business for all groups, such as contractors, dealers, distributors, manufacturers and the utilities. It requires only trained leadership.

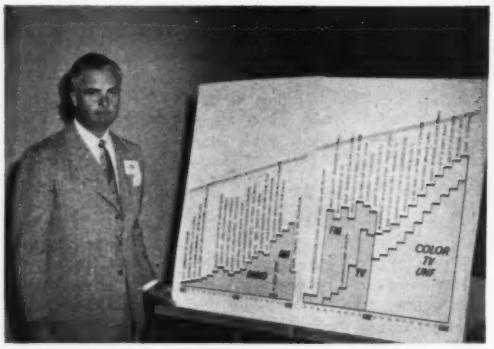
She emphasized that home lighting still needs pioneering more than electric ranges or some of the appliances. The idea must be shown to the people who want to see how it works. As methods for doing so she mentioned light conditioning as a selling feature illustrated with the show General Electric had put on at the national builders convention in Chicago and said a film has been prepared to use before builders to interest them in including light conditioning as a selling feature for houses they build. Another film is being prepared to tell the women in the home the story of the recipe plan and how it can be applied. She maintained that people do buy up to better ways of doing things and are willing to pay for a better service if they see what they are getting.

"If natural gas comes up here, your world will change, and rather rapidly," H. C. Rice, sales manager, Southern California Edison Co., told the conference. He warned that, despite high acceptance of electric appliances in the Northwest, the gas industry was beginning rumors that, if repeated often enough, would be believed and that the coming of the new fuel would cause a considerable loss of business to the electrical industry. "It is not what a man knows that causes him to act; it is what he thinks and with plenty of advertising and selling, many minds would be changed." People with things to sell are not working with a static group of people. He cited figures as to the number of customers who die, number of new marriages and babies born, to remind that the process is fluid and not static. He warned that gas competition is aggressive and alert and the fields in which competition can be expected are: *domestic*—cooking, water heating, space heating; *industrial*—heating, furnaces, heat treating, internal combustion engines; *agriculture* — incubators and brooders, gas engines for power applications and pumping; *commercial*—cooking in hotels, etc. He listed some of the things the gas companies themselves recommend to improve their competitive position and some of the advantages they concede to electricity. These, Rice maintained, were points that should be kept in mind in determining electric utility selling policies. He concluded by showing a number of installations of all-electric equipment in the Edison company territory and the reasons the customers had given for preferring the electric equipment.

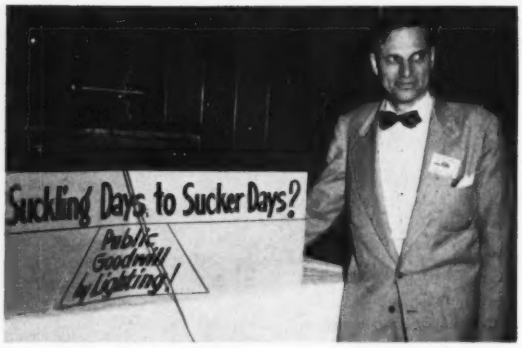
"Commercial Cooking—An Important Source of Revenue," was outlined by Walter Sormane, sales manager, Commercial Equipment Department, Hotpoint, Chicago. After reviewing the growth of commercial cooking business in the United States and the market for more sales, Sormane said that if all commercial cooking equipment sold in 1951 had been electric, 1,200,000 kw of added load and a revenue of $30 million would have been realized. The AGA, in a survey headed, "Who Is Winning the Tug of War for the Commercial Load," itself agreed that it was losing ground to competition with electric equipment during the past two years. Gas equipment sales increased 33%

Roseberry Greisser Olson

Rice Webber



From crystal set to color TV, J. M. Tuttle's timetable



From infancy to psychiatry, Charlie Long's light advice

while electric showed a 59% improvement in 1950; but in 1951, gas equipment showed a 3.6% decrease while electric equipment jumped 167% durthe year.

Despite shortages and restrictions, he promised that manufacturers would provide improved products with more and more automatic operation to outdistance and eventually minimize the competition of fuel-burning equipment. Utilities, however, must aggressively promote commercial cooking and by doing so will find it a fine load and revenue builder. "It has a good load factor, 30% on the average, with much of it during off-peak hours: diversity exceeding 40 to 50% of the total connected load; 100% power factor; good voltage regulation; no instantaneous peaks or load surges. It gives the utility an average of three times the load per equipment dollar than its domestic counterpart. Each $100 spent for new commercial electric cooking equipment represents $70 estimated annual revenue." He followed with examples of where commercial cooking equipment could be sold and described his company's training program to assist in training utility commercial specialists.

The last general session was made up of speakers representing each of the bureaus. Each speaker was introduced by the bureau chairman.

C. C. Warren, Cornell Pump Co., Portland, after reviewing the population growth and need for more food production and the methods of irrigation used, listed the advantages of sprinkler irrigation and then described what an important load this would be for the utility companies. "Sprinkler irrigation offers the largest potential power load in the West today. The question is, do you want it? Is it going to be gas, diesel or electric?" he asked.

He showed that supplemental irrigation formerly meant two to six weeks load but farmers now find they can use sprinkler irrigation over a four-month period, making a desirable power load which balances off electric heating winter load. One of the first requirements, he said, was to establish a policy in rate structure for this business, as a commercial rate doesn't fit, especially the demand rate and stand-by charges.

He enumerated a number of complaints from farmers as to what they consider unjust charges made for demand because of meter readings taken a day or so after the starting of the irrigation system; of companies' unwillingness to cooperate in building or rebuilding lines; of overcharging by private contractors for construction of extensions. He said more knowledge of the starting current requirements of pumps was necessary so that penalties wouldn't be exacted for some of these types of installations.

"Television—America's Newest Billion Dollar Baby," by J. M. Tuttle, Pacific Coast manager, Motorola, San Francisco, proved another fascinating topic to the television-starved Northwest. Entertainingly he presented many shocking statistics as to the financial problem, not only in financing the building of stations, but in time payment capital for the tremendous volume of sets that are sold. In 1947 and 1948, the Bank of America had $4 million in time plan paper in California alone. As a result, he said, "something had to give." What gave were auto sales, gasoline sales, movies had a 70% decline in attendance, the home appliance field cried that TV was ruining its business. There was dislocation in the financing of sports. He discussed the impact on the home and its effect on the furnishings industry, and warned that although "you may say it won't happen at my house, it will."

However, he pointed up some of the educational values and said that it was an ideal medium with which the utility could tell its story. He told of how special events, such as the election this year, General MacArthur's return, the Kefauver investigations, the Japanese peace treaty sessions and the World Series, had made it imperative that all have television in their homes.

He had no good news as to the load of television, since most people seem to turn the lights down when viewing it, but he advocated that utilities sponsor promotion of television for the dealers, as was done by San Diego Gas & Electric. He also named the number of stations scheduled by FCC for the various states of the Northwest but, because of the high cost of setting up a station, discounted the idea that as many as that would be installed for many years to come. As for UHF, "Let's not race our motors about it," for there has been too little experience with it as yet and the stations are more expensive to install than VHF. As for color he said "forget it, everyone is practicing with it and there has been a battle between the giants, but it will be a luxury, like a Cadillac or a swimming pool, three or four years from now."

A new chapter in the story of electric living was proposed by Harold P. Bull, sales manager of laundry equipment, Bendix Corp., South Bend. After reviewing the appliance saturation growth during the past several years, with particular reference to home laundry appliances, Bull made a strong case for the automatic electric dryer. Its sales have grown from 58,000 in 1947 to 495,000 in 1951 and a goal of 6,200,000 has been set by the industry for the next five years.

Although the Northwest leads the country in the number sold and in saturation, he said most of these have

been sold on weather alone. He pointed out there was an excellent summer story that could sell dryers too. The advantages of having a dryer in summer, he said, were that family wash increases 50 to 100% in summer because of more frequent clothes changes. Line dried clothes are affected by smoke, fumes, auto exhaust, wind, dust, summer rains, fog and humidity. Most dramatically told was the fading of fabrics in the sun and he illustrated this with a number of slides.

As a way to get dryers thoroughly accepted, he advocated that utilities have special plans to sell dryers to every employee and that dealers also be urged to sell them to their employees; that influence-making personalities be sought as sponsors for home laundry and that utilities even subsidize advertising costs of dealers who promote their fuel in their dryer sales.

At the end of a long session, Charlie Long, Westinghouse Lamp Division, Los Angeles, made a refreshing closing talk which he titled, "Stay Lit Without a Hangover." After an amusing preamble into psychology and physiology, he finally came to the point of his message: "(1) People are; they have eyes and they use them. (2) Psychology applies to people as well as to cats, such as pride. (3) Lighting is a psychological necessity." As a side remark, he pointed out that the lighting business brought in the highest-rate revenue and that it was a good idea to stay actively in the lighting business.

That the light and power industry needs a trade association to combine some of the activities it has been called upon to carry on through several separate groups, was the meat of the message given by J. W. Parker, director and former president and general manager of Detroit Edison Co., at the closing luncheon. Carl Hoffman, vice-chairman of the section, presided and Kinsey M. Robinson, president, Washington Water Power Co., toastmaster, introduced Parker as the "one and only president of a metropolitan company who has had as much interest in what problems we have here in the Northwest as we have ourselves." Robinson also told that Parker had made his company one of the first members of the advertising program of the utilities, its public information program, and its legislative program.

Contrasting his observations of the light and power industry in Europe with that in the United States, Parker reminded of the tremendous responsibility and obligation that the private companies, who have 80% of the generating capacity of the country, bear in public service. During the past few years something had been happening in the industry that few had been as aware of as they should be. This, he said, was the decentralization that followed the breaking up of the holding companies. When 85% of the companies were controlled by holding companies, decisions were made remotely and often by people not sufficiently in touch with the local conditions to make such decisions.

Now a new and more huge holding company is arising, with its policy-making in Washington, D. C., under the federal power program. This is a queer contradiction. He said the private companies were far better off, far stronger and more responsive to the public since the holding companies had been broken up.

However, there were certain elements of weakness in decentralization and it was realized among the utilities that what affected the Northwest would eventually affect the East. The public power program afflicting the Northwest is now finding a counterpart around Niagara Falls, he said. The private companies are faced with serious problems when they need concerted action. He enumerated some of these problems and said that the industry had blundered in leaving it to federal agencies to determine policies in regard to power supply in the defense emergency.

Sormane Dangler

Bull

Warren

There are many jobs on a national scale that the industry needs to undertake and he reviewed the groups that had been formed, such as the PIP and ECAP. The Edison Electric Institute had been formed for a wholly statistical purpose and could not carry on some of these necessary works. He then advocated a stronger trade organization to encompass some of the large activities, organized on the same basis of volunteer action as ECAP and PIP, with men on the steering committee who are the chief executives of their companies and "no Russian veto. If anyone doesn't want it, he can drop it." Such an organization, he felt, should be from the bottom up, so that it could speak for and vote with authority for these companies as well as bring in their problems. "I would delegate to such a council authority over some policies but limit that authority very definitely," Parker concluded.

Home Service Committee
Anne M. Ogden, PGE, Chairman

After hearing of new sea-food developments from Dr. E. W. Harvey of Oregon State College, Grace L. Phipps, home service director of Sunset Electric Co., Portland, discussed home service from the manufacturer and distributor levels and what it could accomplish for dealers.

That "Selling a Better Way of Living By Television" is possible was told by Mrs. Marguerette Reinhart Detillian, home economist, Seattle. She described her experiences in handling television programs and said she felt closer to her audience than even by radio. Her point was that television widened the scope of demonstration possibilities and that it was a perfect medium for the utility in telling its story. She advocated that every utility should have a program.

A panel discussion on soap and detergents had on it John G. Wood, field representative of Calgon, Pittsburgh; Max M. Gurvich, Pacific Chemical Co., Seattle; Joseph R. Larson, Detergents Inc., San Francisco; and Edith Rausch, Puget Sound Power and Light Co. home service director, acted as moderator. This proved a lively discussion of water, detergents, synthetic preparations, water softeners and soaps. The scope was limited to laundry applications only.

Some 46 attended.

Rate Research Committee
Frank H. Woy, Montana Power, Chairman

Three shirt-sleeve sessions in closed conferences discussed problems confronting the rate, depreciation and

Frank Woy and rate researchers ponder how to say yes to electric heat and break even

valuation engineers and the cost analysts. Primary consideration was given to a discussion of the economics of electric space heating from the approach that the customer is demanding the service from the utility and it is up to the rate man to devise a rate that is fair to the utility and the customer. Duane Olney, Washington Water Power, presented statistics derived from a group of actual customers in WWP territory that indicated a rate level between 1.2c and 1.5c might be economically satisfactory to the company and should prove acceptable to the customer. The study was incomplete and still too small of coverage from which to generalize, but is a good stepping stone for future analyses.

The necessity for demand charge and alternative forms of handling this feature came in for considerable discussion, along with the full realization of the sales resistance it presents. The effect of inflation on rate bases and the difficulty of securing regulatory legislation was discussed. Other topics covered were practices in the Pacific Northwest regarding line extension policies, irrigation pumping, large loads of uncertain duration, accelerated amortization, depreciation practices, street lighting economies, etc.

Commercial and Industrial Bureau
Jerry Collins, PGE, Chairman

The Commercial and Industrial Bureau, made up of a commercial cooking committee, lighting committee, industrial utilization committee, and data sheet committee, had speakers representing each of these at its Tuesday afternoon session. Walter Sormane went into some additional details as to commercial cooking possibilities. He was introduced by A. H. Jaeger, Hotpoint, Seattle, committee chairman. Charles Long, Westinghouse Lamp Division, Los Angeles, introduced by Will Hird, chairman of the lighting committee, Westinghouse Electric Corp., Spokane, demonstrated and evaluated the possibilities of several new lamps, both fluorescent and incandescent. Continued interest in the electric heating of asphalt storage tanks brought forth a lot of discussion following a talk by T. S. Kinney of Western Factors, Seattle. He was introduced by Clarence Scheyer, Puget Sound, industrial utilization committee chairman. Frank Nosworthy, B. C. Electric Co., Vancouver, chairman of the data sheet committee, asked for opinions as to continuation of the publication of data sheets and the group voted they should be continued. Awards for the prize data sheets for the year were made.

Feature production of the afternoon was the first showing of a model schoolroom designed by Chester Jarrett, Portland General Electric Co., to take to meetings of school officials throughout Oregon. Hibbard Johnson, manager of districts, PGE, told briefly of the Portland program, in which model schoolrooms were installed in several schools and groups of school officials, PTAs, etc., given a seminar in these classrooms. The work has resulted in a desire for complete modernization of schoolrooms. It was found that old buildings of the 1908-12 vintage could be remodeled at a cost of only 10% of what it would cost to build a new classroom. The model itself is portable and can be set up to show the schoolroom as it is; then the walls can be changed to show what new painting would do. Ceilings are removable and either fluorescent or incandescent fixtures are put in and, with an ingenious tree of light cells, readings of the footcandles can be shown, enlarged on a screen. (Story on this program is scheduled for publication in the near future.)

Electric Home Bureau
E. W. Hatch, WWP, Chairman

Electric house heating boiled over in the Electric Home Bureau half session Tuesday. In a plain-spoken paper, Henry "Electric" Smith, Spokane, accused the utilities of antagonizing the public with their attitude toward electric house heating. He said there is terrific public interest in it and the customers ask why the utilities seem so reluctant to tell them anything about it, when they are so eager to have them use all the other services of electricity. "If your kilowatts are so darned effective for these things, why don't you convince me they will do a better job of keeping my family warm?" He listed the reasons given for reluctance and then argued against each.

1. *"The load factor isn't good."* "Neither was the load factor of lighting good when you started business."

2. *"Such usage would require extensive rebuilding of distribution facilities."* "That's what we are in business for — to distribute more and more energy to more and more electrical devices through more and more wire. You originally built these facilities with no hope of amortizing your investment for many years. You added to your facilities and lowered your rates to encourage greater use of them. It worked."

3. *"Government regulations have stood in the way"* . . . "It has seemed to some in the industry that utility people rather recommended those particular regulations. If government interference still stands in the way, it is an all-industry project to remove it."

4. *"Generating facilities are already overloaded."* "That problem is being met rapidly. It is not too soon to start building demand for the increased supply that will be coming on the lines.

5. *"Government controls dam sites and discourages private expansion, then it turns around and oversells the power of the Northwest to heavy-consuming industries."* "That is a real problem. We think an aroused public, fully informed of why it cannot enjoy the benefits of electric heat, would assist, but first we have to convince it of those benefits."

He also maintained that the industry had thrived on pioneering and electric heat should be given a trial with promotions and education, etc.

This brought on considerable discussion in which some of the rate men participated. Others agreed with Smith that, instead of discouraging it, a rate should be developed that would

be compensatory and then sell the service to whomever wanted it, explaining fully its limitations, etc.

Demand rates were also protested very strongly by several in the discussion period and the rate men defended the necessity for a demand charge. Joseph Picatti, Yakima electrical contractor, urged that some simpler method be used to show customers the amount of investment needed to serve a kw and to simplify the rates, because anything that took too much figuring and brought different answers from different offices of the same company aroused suspicion and public resistance.

In another paper, R. A. Wilkinson, NECA chapter manager of Spokane, said the key to adequate wiring is to develop adequate contractors. He said there were plenty of techniques for selling adequate wiring now and what was needed was to stop talking and start using them. The development of adequate contractors, he said, would result in more contractors who would refuse to wire a home unless it was wisely planned for the future.

Mary Webber maintained that it was impossible to plan adequate wiring without first planning adequate lighting for the home and, if the lighting was sold first, the wiring would automatically follow. She said the standard should be revised for the dining room, kitchen, bath and laundry, to fit the light conditioning requirements necessary.

Rural and Farm Bureau
R. H. Gram, B. E. Electric, Chairman

Irrigation by means of sprinklers was discussed thoroughly by Clint Warren, Cornell Pump Co., Portland, himself a farmer as well as a pump man. He discussed the subject from the matter of saving the top soil from erosion and cited some examples of shameful waste of top soil in the Grand Coulee project, where lands are being leveled with bulldozers for flood or rill irrigation. Such leveling deposits the good top soil into gullies and leaves exposed soil which will take years to condition for proper crop production.

H. G. Lehl, General Electric Supply Corp., Portland, discussed some possibilities of farmstead wiring, using the low-voltage relays for switch control.

C. A. Root, Pacific Power & Light Co., Portland, gave an inspirational talk on why power companies should promote the 4-H and FFA clubs and the interest that electric projects could be made to generate among the boys and girls who will be the citizens of the future.

Panorama—the PCEA Convention

For the first time, the PCEA convention, held this year at the Hotel Coronado on June 11, 12, and 13, did not include parallel sessions. Instead, the convention consisted of general sessions, held on the afternoon of the opening day, the morning of Thursday, and the morning and afternoon of the last day. Thursday afternoon was set aside for the annual golf tournament. Nongolfers spent the afternoon at diversions of their own choosing.

The Wednesday afternoon session was presided over by George C. Tenney, president of McGraw-Hill of California. The program consisted of the president's address, by PCEA President E. D. Sherwin, San Diego Gas & Electric Co., a talk entitled "Toil, Taxes, and Trouble," by Vivien Kellems, the Kellems Co., Connecticut, and a talk entitled "Cotton, the Most Important Fiber Known to Man," by Hugh Comer, president of the Avondale Mills, Alabama, and director of the Allis-Chalmers Mfg. Co., Milwaukee, Wis.

H. H. Courtright, division manager of PG and E, Fresno, presided over the session on Thursday morning. Speakers during the sessions were: George M. Gadsby, president and general manager of the Utah Power & Light Co., Salt Lake City, and president of the Edison Electric Institute, who spoke on "A Year in the Front Line"; W. V. O'Brien, commercial vice-president, General Electric Co., Schenectady, whose topic was "The Electrical El Dorado"; Harold L. Moore, vice-chairman of the Administrative Services Section, who reported on his section's activities; J. M. McKibbin, vice-president, Westinghouse Electric Corp., Pittsburgh, Pa., whose topic was "The Set of the Sail."

R. W. Turnbull, commercial vice-president, General Electric Co., San Francisco, was chairman of the Friday morning session. Speakers were: C. W. Theleen, manager of sales, General Electric Co., Louisville, Ky., who discussed "The Marginal Forty"; H. C. Rice, chairman of the Business Development Section, who reported on his section's activities; Alf Hansen, chairman of the Engineering and Operating Section, who reported on his section's activities; and Ralph H. Flynn, publisher, *Electrical World*, New York, whose topic was "After Mobilization—What?"

On Friday, I. W. Borda, vice-president of The Okonite Co., San Francisco, presided over the luncheon meeting, which featured a talk entitled "America Tomorrow," by Carl Taylor, president of the Waukesha State Bank, Waukesha, Wis.

PCEA President E. D. Sherwin presided over the Friday afternoon meeting. Speakers were: E. S. Hochuli, manager, Industrial Relations Dept., General Petroleum Corp., Los Angeles, who discussed "Management As Salesmen;" and Allan A. Smith, attorney, Portland, Ore., whose talk was entitled "Federal Encroachment in the Field of Electric Power."

The convention closed on Friday afternoon with the annual business meeting.

The annual banquet and dance was held on Friday evening, preceded by a cocktail party sponsored by the manufacturers, manufacturers' agents, and distributors.

Entertainment for the ladies included a fashion show and tea on Wednesday, a boat cruise on Thursday, a luncheon and entertainment on Friday, and card games.

General chairman of the convention was H. G. Dillin, assisted by Stage Manager L. C. Kobler, both of the San Diego Gas & Electric Co.

Committee chairmen were: attendance, Albert Cage, president, California Electric Power Co., Riverside; banquet, L. M. Guibara, sales manager, U. S. Rubber Co., Los Angeles; cocktail party, D. P. Cady, district manager, Maydwell & Hartzell Inc., Los Angeles; golf tournament, R. T. Redfield, manager, Graybar Electric Co., San Diego; hotel, William deWaard, manager of purchases & stores, San Diego Gas & Electric Co., San Diego; ladies' entertainment, H. A. Cordes, manager, General Electric Co., San Diego; program, F. A. Tracy, president, Sierra Pacific Power Co., Reno; publicity, F. M. Raymond, advertising manager, San Diego Gas & Electric Co., San Diego; reception, H. H. Courtright, division manager, PG and E, Fresno; registration, E. B. Kruger, Southern California Edison Co., Los Angeles; transportation and general information, H. B. Wylie, transportation superintendent, San Diego Gas & Electric Co., San Diego; ushers, J. L. Tindale, district manager, Anaconda Wire & Cable Co., Los Angeles.

Cummins Corette

Kirk Purton

Setterstrom Emery

Engineers' Job: Fine Service, Low Cost

Engineers have a responsibility to see that the best possible service is rendered at the lowest possible cost. That was the admonishment of management to those who attended the meeting of the Engineering and Operating Section of the Northwest Electric Light & Power Assn. at Great Falls, Mont., May 7-9. J. E. Corette Jr., vice-president and assistant general manager, Montana Power Co., put it in these words: "The electrical industry cannot prosper, cannot survive the battle before it, unless the engineer builds electric facilities and operates them in such a manner that the people will receive fine service at low cost. As I view the industry, fine service at low cost is the vehicle on which we must ride into the future, it is the foundation of our future progress and success, it is the job of the engineer."

A. S. Cummins, president of the Northwest association and president of the California Oregon Power Co., defined the role of the engineer in these terms. "Every effort must be expended to assure the fullest conservation of our company resources by planning wisely, estimating accurately and building adequately. At perhaps no time in history was this need so great. Tremendously expanding service demands, coupled with inflated costs, have completely eliminated any margin for error and call for the highest degree of engineering skill and ingenuity. The matter of system losses should be restudied, for the recovery of capacity and energy, and every other item of possible saving be explored to the end that capital spending be held to a minimum. You men of the engineering profession have my profound respect and admiration and I know that we will have your full support in meeting our challenge and accomplishing our mission. Your recommendations and decisions can do much to shape the destiny of this industry."

Providing the money for system expansion to meet growing loads is one of management's biggest headaches today, said Cummins. He reported that the companies comprising the Northwest association as a group have budgeted $647,500,000 for expansion in the five-year period ending 1956. Of this, $297,400,000 is earmarked for building 1,715,800 kw of new plant, thereby increasing present availability by approximately 75.5%. Electric service cannot be expanded, he said, unless additions and improvements can be financed and they cannot be financed unless a high degree of public confidence exists not only in the ability of management but in the thinking and attitude of regulatory bodies. Nobody welcomes asking for higher rates, but adequate service comes first and if the meeting of that essential requirement means more revenue, then rates must be increased, said Cummins.

Harry M. Jones, Idaho Power Co., in response to Corette's welcome, said, "We engineers need added inspiration to work out our common problems." On behalf of the group he expressed appreciation for the inspirational address given by Corette. The meeting

Gordan Shevalier

Van Wagner Kenneally

Ashworth Jones

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was opened by Cecil Kirk, chairman of the Engineering and Operating Section, who with Dick Setterstrom, Dix Shevalier, Dick Dickenson, Herb Magnuson, George Scotten, Regan and other boys of the Montana Power Co. had opened the session with a bang — the bang of six-shooters — in true Western fashion. Firing of six-guns by the cowboy-clad Montanans to call meetings to order was the rule throughout the conference. Tension of the "dignified" engineers at each session was relieved by a stunt of some kind that brought a smile and a laugh and gave the meeting a true Western flavor. Attendance records were broken and a high mark was set for T. A. Purton, Utah Power & Light Co., newly elected chariman of the E & O section, to live up to.

Purchasing Committee
William C. Allen, Chairman

Speaking of the importance of standardization, Howard Arnett, Portland General Electric Co., said that his company had saved $12,000 a year as a result of standardization of transformers, crossarms and other items. He feels that there is little justification for requiring exacting engineering specifications and that it is far better to choose from the nearest standard. Standardization offers handsome returns for anyone willing to work at it, said Arnett. He feels that efforts should be redoubled to work with manufacturers and suppliers to effectuate standards.

The national materials situation was discussed by C. T. Hurd, DEPA, Washington, D. C. He made these points: The outlook for delivery of generators and station transformers is good, but the picture on boilers is not so favorable; boilers production may well be the bottleneck in achieving DEPA's goal for 9,000,000 kw of new capacity this year, and 32,000,000 kw for a three-year period; the component situation is improving; the electrical industry has no preferred status; we are going to lose 25% of steel this year; we are not ready for decontrol—today we would be far worse off under decontrol and a competitive market; there is nothing in prospect to indicate an improvement in copper —there is only 50% enough; aluminum is improving and DEPA may be able to release ACSR for overhead ground wires; there will be a lot of slippage in delivery schedules in the third and fourth quarters that will delay completion dates for new generation.

Power Production Committee
Dix Shevalier, Chairman

The savings made possible in turbine construction by the use of welded steel plate scroll cases were pointed out by William J. Rheingans, Allis-Chalmers Mfg. Co. He said that $45,000 can be saved on scroll cases by purchasing them for field welding instead of field riveting, and further that welding of guide veins has effected substantial savings over riveting. Rheingans discussed pumped storage at some length, calling attention to the fact that Europe has 8,000,000 kw in pumped storage plants, used not only for daily but for weekly and seasonal storage, and urged that hydraulic projects in this country be studied with a view to taking advantage of the reversable pump-turbine. Over-all efficiency is about 70% and two-speed motor-generators can be used in many cases to gain efficiency. He said the first installation of a reversable pump-turbine in this country is now being made by the Bureau of Reclamation on the Colorado River-Big Thompson project.

R. P. Mortell, Puget Sound Power & Light Co., discussed many ways in which latent megawatts could be secured from existing plants and equip-

Arnett Pearson

Cutter Mortell

Duffy George

Blankmeyer Lanning

Sawyer Ebbe

Donnelly Gamble

ment. Under hydraulic improvements he listed automatic control of diversion dam gates to maintain peak flow capacity in flumes or canals, increased upstream storage, utilization of temporary flash boards on dams for seasonal storage benefits, enlargements of buckets and installation of improved wheels, reduced seal-ring losses, lowered tail-bay elevation, and operating for peak output. For increasing generator capacity he mentioned installation of rotor fans or increased size of existing fans, addition of supplemental blowers, installation of air coolers, improved air flow with guide-veins, blocked out end-shields, installation of modernized stator windings allowing increase in copper cross section, reduced local losses, increased operating temperature levels and improved coil ventilation, and the reinsulation of generator field windings to permit operating at higher ratings. Mortell went on to outline improvements that could be made in switch gear, cooling and ventilating of power transformers, and savings that might be made through preventive maintenance and by improved operating practices.

Rebuilding of the old hydroelectric plant at Willamette Falls at Oregon City was outlined by Howard Arnett, Portland General Electric Co. Unusual features of the reconstructed plant will be movable-blade Kaplan turbines, induction generators, semiautomatic operation and the use of an automatic siphon to take care of load rejection and spill 7,000 sec ft of water in a matter of seconds from the forebay.

Atomic energy was discussed by W. K. MacCready, Hanford Works of General Electric Co. He said that use of atomic energy divides itself into two weapons, isotopes and power. Important developments are taking place in the field of radioactive isotopes, he said, and in the food and drug field alone much cheaper processes may be possible through the use of isotopes. He discussed atomic-powered submarines and mentioned possibilities in the aircraft field. In the field of power, MacCready feels that high first cost and lack of advantages are deterrent factors militating against early use of atomic fuel for electric power. He said that it would be 15 to 30 years before atomic energy can stand on its own feet economically and be a factor in power production at competitive prices.

Electrical Equipment Committee
Waldo Enns, Chairman

The autotransformer, its uses and problems, was discussed by A. Boyajian, General Electric Co., Schenectady. He said that as the major value of the autotransformer is economy and that this is a function of its coratio, it follows that when the economy is small the advisability of an autotransformer should be seriously questioned. As a rule of thumb, he said, when the low-voltage line voltage is less than half of the high-voltage line voltage it is well to weigh the problems and savings of the autotransformer as compared with a conventional two-winding transformer.

W. W. Bonar, Portland General Electric Co., in discussing load capabilities of transformers said there was a need for better manufacturing control by manufacturers. He said they had found a 20% difference in load capability of identical transformers. O. B. Falls, General Electric Co., said that transformers made before the mid-Thirties were not designed for fans and that before users applied fans to gain additional cooling they should check with a manufacturer to be sure of the ratio between hot-spot temperature and operating temperature.

In discussing relays, C. G. Mills, B. C. Electric Railway, said that his company had experienced difficulty in picking up loads after feeder interruptions of 30 minutes. They have adopted relay settings, 400 amp above the normal 30-amp rating of the circuit, with successful results. L. A. Carter, Pacific Power & Light Co., reported that they had found on faulty trip-outs that 10% of the trouble was because of protective relays, 75% from auxiliaries and 15% on circuit breakers.

Transmission and Distribution Committee
Glen R. George, Chairman

This session was devoted almost entirely to the use of aluminum conductors in the power industry. A number of operating men, as well as manufacturers' representatives, participated. All agreed that the use of aluminum for distribution presented a number of problems. Chief of these was the problem of connectors for making splices and taps. It was pointed out that the use of an antitoxidant on all connectors was necessary but that this was not a real answer to the problem. Several manufacturers reported that they were working on the problem of splices and connectors and hoped to be able to come up with a solution before too long. John Bankus, Portland General Electric Co., reported on a recent EEI meeting where the subject was discussed and said that the consensus of that group was experience throughout the country should be compared and that the answer to the problem must come from some research organization.

Utilization Committee
M. D. Duffy, Chairman

E. W. Hempel, Utah Power & Light Co., outlined rural line construction methods used by his company. He described the promotional program of his company to stimulate greater use of electricity on the farm by existing customers, and mentioned a multitude of electrical applications on the farm.

A. I. Sawyer, Idaho Power Co., brought up the subject of use of

McLean Smith

higher voltages for commercial wiring. He said that a new high school in his territory wished to use a 277/480-v system. Lighting ballasts would be 277 v and dry-type transformers would be used for 120-v equipment. He raised the question as to whether or not the utility should be called upon to supply the special transformers for furnishing this type of service. The whole question of higher utilization voltages was a live topic and considerable discussion ensued. It was agreed that the subject was of such great importance that it should be a number one item on the agenda of the committee for the ensuing year.

O. B. Falls, General Electric Co., gave an excellent paper on forecasting residential loads. He said that he looks for a residential load of 20 to 25,000 kwh per year in the Northwest in the next 25 years. He said that a lot of system planning would be needed but added that he felt that the present type of distribution system could be expanded for these larger loads.

Meters, Code and Services Committee
Ralph C. Guse, Chairman

Problems involved when utility lines cross or parallel railroads were discussed by F. L. Steinbright, Northern Pacific Railroad Co. He said that from the safety standpoint attention must be paid to conductor short spans, good poles and guys including side guys. Paul Ashworth, Telluride Power Co., said that the railroads were unrealistic in their requirements in view of the excellent performance records of overhead lines and he questioned the wisdom and necessity of shorter crossing spans over railroads.

A. J. Petzinger, Westinghouse, talked on the characteristics and application of thermal demand meters. He traced in interesting fashion the history of the thermal demand meter and its evolution throughout the years to the present reliable and very useful devices.

Electronics Committee
A. A. Noon, Chairman

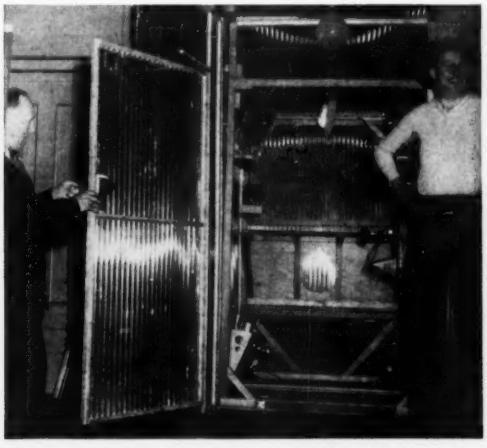
The importance of making a careful survey prior to the installation of a microwave system and the various techniques that may be used was discussed by R. G. Maddox, Federal Telephone & Radio Corp. He said that guyed towers for antenna dishes have proved cheaper and entirely satisfactory as compared with rigid, expensive, self-supporting steel towers. Where communication needs require more than three or four leased circuits, then microwave is cheaper, said Maddox. He said that microwave can be installed for $600 per mile for eight through channels.

Leonard Walker, Motorola Inc., described the aperiodic or broad band coupling unit developed by his company. He said this unit had great economic advantage to the utility in power line carrier work because it extends the range of power line carrier from three or four channels to as many as seventeen. Only one coaxial cable is required between the coupler and the electronic equipment.

L. A. Carter, Pacific Power & Light Co., described the microwave system that will be installed between Merwin hydro plant on the Lewis River and the new Yale plant 12 miles above, to provide supervisory control for the latter. Line of sight is impaired by the river canyon walls, making necessary installation of a reflector even in this short channel. Frequency will be 6,705 megacycles and the power 10 w.

House Heating Research Committee
Wallace Gordon, Chairman

The house heating research committee heard a progress report on the heat pump from Prof. G. S. Smith of the University of Washington, and a discussion of peak limiters by J. O. McAdam, B. C. Electric Co. McAdam reported tests on a group of houses with space heating. Houses with thermostatically controlled heaters showed a demand per house of 8.2 kw. Houses with manually controlled heaters had



Firing of six-guns by Shevalier, Scotten and Dickenson (left to right) was the call for sessions to start. At right: Cecil Kirk and Dick Setterstrom demonstrate rural load-building in Montana, a la Western. They start with the Chick Sale. It has a 1,000-w yard light, a 200-w reading light, a 1,500-w fan-type heater, 100-w exhaust fan, 50-w germicidal lamp, a radio at 50-w, two 250-w infrared lamps, and other accessories. "Here we have a load of 3.5 kw," said Kirk, "and we haven't even started on the house."

a demand of 6.2 kw, a difference of 2.1 kw. Thermostat control increased the demand by 0.4 kw. Homes with load limiters had a connected load of 5.4 kw more than those with thermostatic control, but a demand of only 1.6 kw more.

He said that 80% of new house heating installations in Vancouver were using peak limiters. A demand charge of $2 per kilowatt over 7 kw encourages the use of demand control devices.

A special evening meeting was held to hear a discussion of the causes and effects of cavitation in the hydraulic turbines by W. J. Rheingans, Allis-Chalmers Mfg. Co. He discussed the use of stainless steel runners and of stainless steel welding for repairs and showed the effects of the various stainless steel alloys on resistance to cavitation. A new aluminum-bronze alloy was mentioned that so far shows better cavitation resistance properties than any other metal ever tried.

Dan Kamphausen, the Dan Kamphausen Co., Denver, presented a sound-color film showing the below-the-ground line Osmoplastic treatment for standing poles and the large savings made possible by such a method of treatment.

At a noon luncheon Robert Ball, Idaho Power Co., discussed the Hells Canyon project proposed by the Bureau of Reclamation and pointed out the very high cost and fallacy of this project. He said that for the 100 to 125,000 megawatts for the Hells Canyon Dam as proposed by the bureau over five low dams proposed by Idaho Power, the cost would be $500,000 or $3,000 per kilowatt. It is difficult to use facts to fight propaganda, he said.

NECA Dist. 6 Tackles Problems

Line constructors' problems with unions and general contractor competition, pending federal legislation to protect subcontractors from predatory general contractor bid-peddling; the accounting and estimating educational program, labor problems in various areas, aluminum vs copper wire, bettering the apprenticeship program, the Sylvania contractors' lighting maintenance program, Westinghouse's home wiring estimator, chapter growth and progress and some hard-boiled selling pep talk made the annual District 6 conference of National Electrical Contractors Assn., at Santa Barbara's Mar Monte, May 9-10, a full and a practical man's program. With a registration of 155 there was representation from practically all chapters in Washington, Oregon, California and members from Nevada. National officers, Paul Geary, executive vice-president, and E. R. "Al" Cornish, former Oaklander, director of NECA's research and education, and district vice-president, J. D. O'Connor, of Sacramento, brought the national picture into focus. Labor's representatives heard were Oscar Harback, regional vice-president of International Brotherhood of Electrical Workers, San Francisco, and Otto Reiman and Les Morell, IO representatives, at the line contractors' session prior to the regular meeting.

The California Central Coast Chapter of NECA, with John Heritage of Santa Maria as president and Will Pregill, chapter manager, acted as host whose hospitality overflowed the usual limits in such affairs to make the conference a long-to-be-remembered one.

Since contractors like specifications to be brief and specific—here's a spec sheet of what happened:

Line Construction

Where to get men trained in the variety of skills required by contractors in line work was a major concern at the joint dinner of California-Nevada and Northwest Line Constructors Chapters, with John Schetky, Western Electric Construction Co., Portland, acting as chairman in the absence of R. C. Hughes of Spokane, chairman for the district.

Among skills now required are knowledge of new materials, aluminum welding—a very special skill—operation of power tools and field equipment, rigging. Difficulties are that in the Northwest power lines are worked cold; in the Southwest on distribution lines they are worked hot, requiring special training. There's a difference in steel-tower and wood-pole requirements in skills. Apprentices should be allowed to climb and thus learn—the rules prohibit it now. Differences should be made between groundmen who are not apprentices and those who are learning to be linemen. Is there enough employment to make apprentice training in special skills worth-while to the specialist?

Suggestions made were for unit-of-work training and the apprentice's card should show his qualifications for special skills. A committee of NECA and IBEW was advocated to study

O'Connor Duncan Hermitage Pregill

Sherwood Casey

Harbak O'Connor

Geary Cornish Buttner

the qualifications and training necessary and to work out classifications such as groundman apprentice, groundman, lineman apprentice and lineman.

The second major topic was that electrical contractors under IBEW contract are not competitive with general contractors because the latter can employ laborers and other crafts at lower scales, whereas union electrical contractors must use IBEW men for all work at higher wage rates. The matter of jurisdictional zones, it was reported, is being worked out by area agreements. In such areas contractors can assemble a crew and move it across local jurisdictional lines to complete a line project crossing several such areas. The Northwest Line Constructors have such an area agreement in Washington, Oregon and northern Idaho. A new agreement, it was announced, has just been reached covering 17 locals in Montana. The Montana Chapter, under William Blackmar, assisted by Larry Rodgers, Northwest Chapter manager, completed that agreement in early May. In it foremen are recognized as part of management, something the union was reluctant to accept. An area agreement exists in northern California and northwestern Nevada, but none as yet has been worked out for southern California and southern Nevada.

It was also suggested that the NECA research staff do some study on rental of heavy equipment used in line work, its availability, sources, prices, etc. Also develop sound bases for depreciation of such equipment where owned by a contractor.

Two highly important cases placed in the lap of the National Labor Relations Board for decision were described. The operating engineers union has asked to be certified for a number of operations in connection with line and substation construction. The IBEW is contesting this and, in order to forestall a similar claim from the teamsters and others in the Northwest, it has asked to be certified for all line and substation work. Both cases are expected to be a major battle.

Selling by Contractors

In two luncheon talks contractors were pepped up first by Tony Whan, an inspirational and humorous address; then by William Cranston Jr., hard boiled and outspoken president of Thermador. Whan capsuled four behavior traits of people around which all selling is done. They are: (1) People don't buy what they need but what they want. (2) 87% is purchased through the impression of sight, 63% of all purchases are made on impulse. Mrs. America buys "old friends" (brand names). (3) American people don't like to feel they are being sold, they like to buy and they are the greatest buyers in the world. (4) The most important person in anyone's life is himself, so put your proposition into his language. Whan warned that if America does not produce the sales forces to sell the tremendous production possible after the military period is over it may slip into socialism.

Bill Cranston in "It's Not as Bad as You Think" said "there are two kinds of guys in this world, those who think the bottle is half empty and those who think it is half full." Contractors, he said, are the road builders of the industry, constructing the highways over which the industry's appliances and equipment can run. In urging contractors to sell up instead of chiseling down and then trying to chisel the wholesaler he said, "If you will spend as much time on selling as you do on worrying about controls and doing the buying to make it tough for your competition, it will bring more prosperity." The last two years he called phoney, powderpuff days compared to the 1930's.

Roger Delander of Sylvania Electric Products reviewed the selling program on fluorescent lighting maintenance his company offers contractors. It furnishes complete kits including a series of letters and mailings to prospects, backed by advertising and sales helps.

Bruce Bates, Westinghouse, explained the way in which the home wiring estimator prepared by his company can be used by a contractor not only to submit bids but also to show the need to provide more circuits to serve the appliances needed in the home. In a talk on aluminum E. A. Casey of Anaconda Wire & Cable Co. assured that the Anaconda "Power Up" program would be resumed as soon as possible. (The paper on Aluminum has been promised for a later issue.)

Labor Problems

Dominant subject at all meetings of contractors is labor, the commodity that they cannot exist without but that has grown so topheavy in importance it threatens to put them out of business as individual enterprisers. Vice-president O'Connor, reporting on the district's progress since a year ago, urged chapters to be firm about demands for increased wages and fringes, since business is slack and contractors are pricing themselves out

of the market. In many areas all small work is going nonunion and noncontractor. Ed Buttner, Oakland, labor relations committeeman for the district, ended his report on a similar warning note. He said he felt that the end of rising wage rates had been reached. People in the middle-income brackets cannot afford a $3-an-hour wage rate with a contractors' cost of doing business added to it, and much of such work is being done nonunion or by the owners themselves.

Buttner reviewed many aspects of the labor relations situation. NECA may try to enlarge its scope to encompass radio and TV servicing companies. The Council on Industrial Relations, he said, had doubled the panel from which to draw to hear disputes, Richard Arbogast of Los Angeles and S. I. Jaggar of Portland as well as Buttner are now on the panel from the West. The IBEW and NECA have both withdrawn from the AFL national joint board for jurisdictional disputes. He told of the NLRB cases for jurisdiction in the West on line work. Proposal to bring the motor shops into the pension fund, he said, was being opposed by the employers, their contention being that high labor cost already makes repairing and rewinding charges too close to new motor prices.

Employment in District 6 area, as reflected by the pension fund payments, has fallen off 6.7% this year as against a national drop of 1%. So far, he said, no chapters have negotiated for any health and welfare plans although some have agreed to study the question.

Paul Geary, reporting from national headquarters, listed as the most serious problem facing contractors that of being eliminated or absorbed by the general contracting industry. Another problem was the failure of the contractors and union to occupy the entire field of electrical contracting. "They have been choking this industry by picking only what they think is the most desirable kind of work and passing up new developments and applications. Many have a superiority complex about house wiring. As another problem he said that NECA still represented too few contractors. In 1950 its members employed 49% of the union electrical workers in construction, nonmembers 47%, general contractors 4%. NECA covers only 207 of the 523 IBEW locals. Many areas are too small to support chapters and means must be developed to give field service to such areas.

Oscar Harbak, IBEW vice-president, asserting that he knew he was putting his head on the block, talked frankly about some of the internal jurisdictional difficulties in the IBEW with its many branches and between IBEW and other unions. The position taken by IBEW since the first transmission line was built for the government in 1937 was to supply electrical workers to whomever built the transmission lines in order to keep that work for his union. "That's our first responsibility to our men," he said. He told of the pending NLRB cases and predicted a long contest. He maintained that ideal policies could not always prevail and that both employers and employees had to be realistic.

He was bombarded with questions as to individual cases and, after a luncheon recess, it was suggested by Geary that Matt Sherwood, field director of NECA, gather a list of complaints from contractors and that Buttner appoint a committee of five contractors to meet with Harbak and union business managers to consider them and try to reach conclusions that would clear many of these causes for dissatisfaction.

Apprenticeship training was touched on by several and discussed in detail by Stan Adams of Portland who has made it his hobby. Adams told in detail how the joint board of employers and union works in Portland and the administration of the program. He stressed in particular the aptitude, intelligence, physical and character standards being required that result in turning out exceptionally well-qualified wiremen.

Education for Good Business

The one creative and constructive activity—most of the others are defensive—of NECA, the research and education program, was re-emphasized by Cornish in what he called, "Operation Bootstrap." Noteworthy progress has been made in the past year. There was 754 enrollees; there are 25 formal classes sponsored by chapters and six courses have been completed, a total of 31. The first course on accounting met fine response. Interest in the second course on estimating is being started now. Future courses are planned on job management, business administration and sales engineering. Eventually, he said, other courses on the practical application of the National Electrical Code and on job engineering may be developed. The courses can be had either in class form in cooperation with schools, by correspondence classes, or by individual correspondence course.

A second great need, Cornish stressed, is for more statistics about the electrical contracting industry. Appreciating the reluctance of contractors to fill out questionnaires, he stressed the need and asked for cooperation. Such data help the association represent the contractors before government agencies, manufacturers, distributors, unions, and the public. A second benefit will come from passing on information valuable to the conduct of the business.

Other functions of the research department, he said, included such things as counteracting the recent attempt of NPA to further reduce the amount of copper allowed to wire a house; representation on industry committees such as adequate wiring, interior wiring design; debunking such articles as appeared in *Magazine of Building;* study of codes and ordinances and representation on code making panels.

Legislation and Other Topics

A report from George Roscoe, director of governmental affairs for NECA, was read. It reported on work to get Senate Bill 2907 supported by Congress. Its purpose is to establish nonrestrictive rules under which government contracts would be bid but it would prevent bid shopping by general contractors after they have been awarded the work. He told of opposition by AGC and the arguments used against it, the opposition from some agencies that use the same arguments. A similar bill is to be introduced in the House, and contractors were urged to see that their representatives understood why the bill was necessary and how it would protect the government from some of the costly and wasteful practices now being criticized so damagingly.

Roscoe also covered the matter of continuing controls beyond the expiration date in June, OPS amendments needed, the confused metals restrictions despite seeming plenty of materials available.

Other subjects receiving discussion but no formal action included union opposition to use of powder-actuated stud guns; health and welfare programs; an exchange of wage and other demands information from various parts of the district; NECA's participation in PCEA and its request there for a commercial and industrial adequate wiring promotion program; introduction of William Blackmar Jr., manager of the Montana Chapter, NECA, and part-time field representative for the Western region; some

problems in grounding to water systems using nonmetalic piping and blown insulation in walls containing knob and tube wiring that are to be referred to the National Electrical Code for solution; revision of national dues in respect to large temporary members doing government work of large volume but for which dues are not recognized by the government in the costs allowed.

C. D. Casey, president of the Puget Sound Chapter, invited the district to hold its next year's annual conference in Seattle and his bid was accepted. Manufacturers and distributors in southern California hosted a cocktail party both Friday and Saturday evenings and the local chapter, the colorful Spanish entertainment program at the banquet.

Ward Fairman

Langlie Raver

Erdahl Hoffman

APPA Discusses Northwest Power Problems

Power to make decisions in the development of Washington State and Columbia Basin resources must remain in the hands of the people of the region, said Washington's Governor Arthur B. Langlie, speaking before the convention of the American Public Power Assn. held in Seattle, April 29-May 1. "I am not one who says the federal government has no place in development of the Columbia River or the region," said Langlie, "but I want the power to make decisions in the hands of the people of the region. There is no reason why local, state and federal representatives cannot work together in the interest of the people. I am ready to fight in Washington, D. C., for allocations to build dams necessary in the Pacific Northwest." The governor took issue with federal policy directly when he said, " I have opposed the Hells Canyon Dam and will as long as engineering information I have indicates it will not be a practical investment for the people in this area and while there are other dams offering greater returns. The question is, What are the people getting for their dollars?"

Dr. Paul J. Raver, Bonneville Power administrator, had addressed the meeting earlier saying that the Pacific Northwest faces an estimated regional average power deficit during 1952-53 of more than 600,000 kw, including interruptible sales. "Completion of McNary Dam will hardly take care of our present deficit," said Raver. "Other federal dams now under construction are needed to take care of our present normal load growth. We must have new projects, new starts, if we are to serve any important new industrial loads.

"Where are the kilowatts coming from to meet, even in part, the tremendous potential requirements of the Pacific Northwest by 1960?" asked Raver. "These requirements, including both federal and nonfederal loads, can be conservatively estimated at 9,000,000 kw of firm generation compared with 3,000,000 kw today. This simply means that an additional 6,000,000 kw of prime generation, including both federal multipurpose dams and additions of new projects of all utilities, will be required to meet the need. Federal and nonfederal projects now actually under construction will add about 2,800,000 kw of new generation by 1960," he said, "leaving a deficit of some 3,200,000 kw to meet the 9,000,000 kw needed. Construction of the California intertie and federal steam plants would add about 560,000 kw and still leave a deficit of 2,300,000 kw.

"Construction of at least six new federal projects, including Hells Canyon, by 1959-60 will be required if energy demands of the region are to be met. Dams already authorized or recommended, but with no funds, would supply the deficit," according to Raver. "The answer to how many kilowatts," he said, "lies in how soon all utilities of the Pacific Northwest and the people of the region agree that all-out development is necessary and present to Congress a unified and vigorous program for orderly and progressive development of power resources."

"The need to solve problems arising among cities, public utility districts, cooperatives and the federal power system, and the experience brought about by interconnections and war needs in matters involving power producers have made the people of the Northwest familiar with problems peculiarly interesting to the American Public Power Assn.," said J. Frank Ward, superintendent of Tacoma City Light and president of APPA, in opening the convention. Power-wise, a complete coverage of all systems in the Northwest has been well established through the interconnection of federal, private and public power systems, he said. Tribute was paid by him for the fine work of the Pacific Northwest Utilities Conference Committee, of which C. A. Erdahl of Tacoma is chairman, in bringing about support of all power agencies of the Northwest in united action to secure federal appropriations for power development.

Owen Hurd C. T. Hurd

Jones Spowart

Head of DEPA Speaks

James F. Fairman, Defense Electric Power administrator, said that fortunately there is in Washington today a much more favorable atmosphere for electric power than has prevailed since the mobilization effort began. DPA has indicated that it wants to make a 32-million-kw power program possible within the next three years. It recognizes that to do this will require adequate material allotments, a control system that makes it possible to get the allotments, and some expansion of manufacturing facilities for power equipment. Recommendations have been made covering expansion goals for manufacturing facilities for steam turbines, boilers, transformers, condensers, hydroelectric turbines, water wheel generators and air preheaters.

As we look ahead to 1953-54, he said, there is some possibility of directing production of power equipment so that regional situations can be improved. We have not, however, reached any definite conclusions on that subject. The influence of the AEC program on regional needs will, if it materializes, be quite important, said Fairman. The 1,800,000-kw load that is now being discussed will require interim power according to AEC of as much as 400,000 kw.

Fairman said that generator manufacturers are scheduled to ship this year 83% more capacity than actually shipped last year; boiler manufacturers, 2½ times actual shipments in 1951; transformer manufacturers, one-third more than last year. Steam turbine manufacturers are optimistic about their ability to meet this year's schedules, but there is not the same optimism about boiler production.

Gatchell, FPC

Willard W. Gatchell, assistant general counsel, Federal Power Commission, said the commission contends that if the arguments of the Secretary of the Interior are sustained in the Roanoke and Kings River cases, the policy of Congress to encourage development of water power resources by states, municipalities and utilities under the Federal Water Power Act will be substantially nullified. If the licensing authority of the Power Act is to be withdrawn, it should be by Congress, not by administrative interpretation or by the courts.

When he questions commission licenses in California, the Secretary of the Interior says that the Kings River water power sites have been reserved by him in First Form withdrawals under the Reclamation Act for development by the United States and neither the Fresno Irrigation District nor the Pacific Gas and Electric Co. can be given the right under the Federal Power Act to develop power in that stream. Senate Joint Resolution No. 3, adopted last month by the California legislature, asks for the restoration of public entry of all lands in California withdrawn under this particular provision of the Reclamation Act and not within actual authorized federal projects. Gatchell cited granting of FPC license to the City of Tacoma for its Cowlitz development as a case of conflict with state laws. Whether the fish sanctuary law of the State of Washington will prevent construction of the Cowlitz Dams under a federal Power Act license remains to be seen, but at least FPC has expressed its judgment, he said.

Power Is The Key

Electric power is the key to this nation's future growth, said J. Stanford Smith, General Electric Co. America is faced with a food shortage unless productivity per acre is increased and waste of farm products is reduced, partly through greater use of electric power, he said. "The nation consumed more food last year than was produced in 1950. Food production in 1951 will not meet 1952's estimated consumption. America is no longer a surplus nation.

"To meet this food challenge, two very evident objectives must be realized: The nation must increase productivity per acre, and reduce wasted farm products — two objectives that can be accelerated with a greater use of electric power. Extended use of electric crop-drying equipment can save up to 25 or 30 million tons of hay, and 10 to 15 million tons of corn each year," he said.

A clear challenge, said Smith, faces those in the electrical field. Russia, with 25% more people than America, produces one-third as much because the Russian worker has only one-seventh as much electric power at his command. Why should we be content with the help of only 165 electrical manpower for each worker? Why not 200? 300? Why not 500 electrical helps on every job? The way electricity is put to work to multiply our manpower will determine the future growth, prosperity and, above all, the security of virtually every phase of our national life, Smith declared.

Resolutions

Resolutions were passed concerning social security, Niagara, St. Lawrence, Northwest power, Snake River, Alaska, federal-local relationship, water reserves policy, taxation, interest component, FPC jurisdiction, preference clause and state utility commissions. Development of Ice Harbor and Hells Canyon sites was endorsed and it was recommended that FPC deny permits and licenses to private interests for development of the power possibilities of the Snake River system. A long resolution on federal-local relationship contained, among a number of provisions, these statements: "That the duplication of facilities between federal and local public power agencies is uneconomic and undesirable; that local public power agencies should cooperate to utilize and market, to the maximum extent economically feasible, the federally produced electric power; that the Department of the Interior should adopt a policy that would avoid restrictions and limitations in their contract relationships that tend to centralize control in federal agencies and deny the right of local public power agencies to develop their own systems and manage their own affairs.

NWPPA Meeting

A one-day meeting of the Northwest Public Power Assn. was held

preceding the APPA convention. This was devoted largely to reports, a business session and election of officers. Owen W. Hurd, president, in his annual report said that more leadership is needed of the type supplied by Senators Morse of Oregon, Magnuson of Washington and Murray of Montana, and less of the type supplied by Senators Ector of Montana, Cain of Washington, and Welker and Dvorshak of Idaho. More leadership is required of the type displayed by Representatives Jackson, Mitchell, Horan and Mack. "We haven't much to brag about when it comes to the highest office of our state governments. This is the one area where our opportunity for improvement is greatest, in three of the four Northwest states," he said.

"The willingness to compromise, or ignore ethics and integrity on the part of the businessmen and public officials today, should be a challenge to us to examine carefully every issue and every decision in order that our answers and actions be based upon the highest standards of ethics and integrity. When decisions reached meet these tests, we will achieve a unity and strength that will guarantee a maximum of progress and accomplishment for public power." Hurd was elected president for another year.

Election of officers for the APPA resulted in choice of Ralph J. Duvall of Kansas City as president. Next year's meeting is to be held in Boston.

Award for the best annual report went to the Sacramento Municipal Utility District with Carl Rickey, assistant general manager, accepting the scroll on behalf of his organization.

Ample entertainment and excellent inspection trips were provided for delegates. Tacoma City Light was host on a trip to Bremerton Navy Yard and Tacoma. Seattle City Light was host to more than 200 on an inspection trip to its Skagit project.

Utility Radio Group Meets

Occasion of the annual meeting of the National Committee for Utilities Radio, held in San Francisco, May 12-13, was the signal for review of the work of the committee since its last meeting, analysis of the present problems facing the power radio services as a whole, and for suggesting the pattern of future activities of the committee. For the first time the committee was given the opportunity to convene in the Far West. About 50 were in attendance, representing all 10 geographic groups nationally. Work of the committee was outlined in the following report of Chairman John G. McKinley:

"The past year has seen the completion of the final phases of the shift to new frequencies under Part II of the commission's rules. The generally satisfactory condition in which the Power Radio Service finds itself for the present is due in a major degree to the licensee's support given to engineering planning within NCUR.

"Mobile radio having become the indispensable tool that it is, it is important for management to appreciate the fact that the effectiveness of the industry's mobile radio systems is the direct result of cooperation between the licensees in the service, the soundness of technical analysis of problems within NCUR and close attention of NCUR to technical progress and its relation to or impact on existing radio services.

"The work of NCUR and its predecessor Committee C4 under the old Radio Technical Planning Board is responsible for the protection of the mobile radio facilities used in our industry. This means the protection of an investment presently amounting to about $40 million. Considering that this investment is paralleled or exceeded by other users of the radio frequency spectrum it is easy to see why it is vital to the satisfactory operation of our radio systems that management continue the excellent support given NCUR activities in the past.

"This industry as well as all users of the radio spectrum face the problem of an increasing number of licensees having to be crowded into a fixed number of available frequencies. Already the shoe is much too small and the FCC will shortly be faced with the important decisions having to do with relief for the growing mobile services as well as a growing roster of new services. To assume that the present frequency arrangements will necessarily prevail denies the whole history of radio development in this country.

"Channel splitting, interservice geographic sharing and narrower band widths are a few of the possibilities being considered. Continued and increasing emphasis on justification of use and an inventory of all services use of frequencies assigned under Part 11 of the rules are other prospects to be studied in the light of possible rule making by FCC. These facts serve to indicate the necessity for continued attention to the national aspects of radio communication."

New 400 Page Code Takes Schooling

Under the sponsorship of the Electrical Contractors of Washington Inc. a school was conducted in the Seattle downtown Y.M.C.A. from May 5 to June 4, in which electrical contractors and their journeymen were acquainted with Seattle's new electrical code adopted by the city council.

The school, the idea of T. Ralph Neilson, secretary-treasurer of the Electrical Contractors of Washington Inc., was presided over on alternate evenings by Neilson and Arthur Siegal, president of the Electrical Contractors of Washington Inc. John Watts, Seattle building department (electrical division), was the teacher. Registration was limited to 185 contractors and wiremen. Three classes were conducted weekly, on Monday, Tuesday and Wednesday evenings, two classes with an enrollment of 50 each and one of 85. Changes in the code were explained in detail.

A charge of $3.50 for the full course was made.

The code, an instrument of more than 400 pages, was written by men of the electrical industry working under the direction of John B. Majerus, executive secretary-manager of the Puget Sound Chapter, NECA. It was sponsored by the Electric Club of Washington for which Majerus is code chairman.

Shorten Name

Because the name Electrical Contractors Society of Washington Inc. appeared to some to be misleading and more or less confusing, it has been changed to Electrical Contractors of Washington Inc. The address of the organization, which is affiliated with the Mid-West Electrical Council, remains the same, P. O. Box 3243, Seattle 14, Wash. Arthur Siegal is president of the association and T. Ralph Neilson is secretary-treasurer.

Redman Sherwin Doerr Rice McFadden Fisher Wolters

PCEA Business Groups Conduct Workshops

Having had success with workshops in home economics training, kitchen selling, adequate wiring, etc., Henry C. Rice, sales manager, Southern California Edison Co., chairman of the Business Development Section, Pacific Coast Electrical Assn., and his vice-chairman, Vern C. Redman, San Joaquin Division, PG and E, appropriately converted the annual conference of this section into a workshop, even to the featured speakers at the luncheons. Instead of the usual fall conference and a parallel session at the convention, the Business Development Section selected a single annual conference this year at the Huntington Hotel, Pasadena, April 24-25, and the attendance was nearly 300.

Each decade seems to have its "glamour girl" and television was that attraction at this conference. The television committee had record crowds and an exceptional panel of experts from whom to get opinions and ideas to guide the business through its turbulent times.

However, the substantial stand-bys, agricultural power; lighting, wiring and power; school lighting; residential adequate wiring; home lighting; and the home group, such as home economics, kitchen and laundry, all had well-attended sessions. They were characterized by considerable discussion from the floor instead of set speechs or presentations. The workshop idea was carried throughout.

At the first luncheon, presided over by Chairman Rice, R. C. McFadden, vice-president, Southern California Edison Co., made a thorough-going appraisal of the value of adequate wiring to the industry. Showing that the customers now have more on their side of the meter than the utilities on theirs, McFadden illustrated how still it was not enough because of the increased number of appliances used since 1910 (37 today as against one in 1910) and the increased wattage of the appliances. Likewise, many of the newer appliances require special wiring. He indicated that free wiring and subsidies for wiring did not educate the public to the real necessity for an adequate installation and begged the issue.

McFadden then outlined methods used by his company in the sale of adequate wiring to its residential customers through personal contact with those building homes, contact with architects, electrical contractors and dealers.

He cited significant figures from a survey of 196 homes in Orange County, 98 of which had qualified for Red Seal adequate wiring and 98 had not. Of the total, 45 were electrically heated. Of the homes certified, the revenue averaged $160.94 per year for the 45 electrically heated and for the 53 not heated $95.68 a year. The average of the 98 certified was $125.65 a year and those not certified was $61.56, an increase of $64.09 over those not certified. Houses that had been worked on by the field staff of the company averaged $61.56 as against a system average of $46.18, or an increase of $15.38 apiece. A group of speculative homes had only averaged $38.56 per year, which he attributed to a poor wiring installation.

The company has 20 men in the field and in two years had made 27,000 field calls, qualifying 17,000 for further work and had certified 1,363, or one in ten. The field work had resulted in the installation of 16,000 range circuits, 5,600 water heater circuits, 3,600 bathroom heaters and a total of 52,000 kw connected load, and in addition 14,000 kw of space heaters over 2 kw each had been sold. He ended by reminding that the domestic revenue is the most depression proof of all forms of revenue of a utility.

O. R. Doerr, vice-president, Pacific Gas and Electric Co., gave an optimistic review of "How Things Look from Here." Using as his base the 1½ million kw per year being added by the utility companies, he showed that this meant a business of from $500 to $600 per kw, of which the manufacturer got 50% or a million dollars a day and this created business of $3½ million a day to load the lines of distributors, contractors and dealers.

Sensational developments on the

Meise Soper Chamberlain Lind

threshold in technology and chemical industries and processes, a great future in agriculture, long strides in lighting improvement, the impact of TV, new appliances each year, and even atomic power all promise a brilliant business future for the industry, Doerr said. The soft spots in the economy at the present time, he felt, were of short-time duration. The Russian threat of course could turn the timetable any day but as factors in favor of the United States he compared the generating capacity of Russia and the United States and the latter's industrial capacity as greater safeguards to peace than the atom bomb.

The second day's luncheon was characterized by a swift review of the committee's activities, given by Vice-chairman Redman. Those reviews substantially follow in the reports of the individual committees.

Speaker was C. W. Leihy, executive vice-president, Electrical Publications Inc., Chicago, former ELECTRICAL WEST editor. That mass production on the scale now possible in America requires new mass methods of marketing to move the merchandise in pace with productivity was the theme of Leihy's talk. He summarized the increases in population, the growth in disposable income of the population, and said that within the business lifetime of all in the group it spelled great opportunity.

Then he cited the figures of productive capacity of such manufacturers as General Electric Appliance, Frigidaire, Westinghouse, Whirlpool, etc., one factory of which can turn out as many as 60,000 per day on a single-shift operation in major appliances alone. Hence, appliance merchandising presents the most challenging new set of conditions ever faced by the industry.

He maintained that old-fashioned sales training would not move such production to market. There are twice as many major appliances to sell, one-half again as many prospects, changes in geographical groupings, more metropolitan areas and less rural population, decentralization of big centers to surburban shopping areas, and a new distribution of purchasing power. Spending habits have changed also in the last 10 years with the auto industry growing and taking a larger share, and making tougher competition for other services and devices.

Selling itself is changed, he said. For one thing, television has made the cold canvass obsolete and margins make door-to-door selling unprofitable. He advocated consideration of self-service methods of merchandising. Personal salesmanship cannot be wasted on cold canvassing. Sales people need to be trained for quicker approach and close; more mass demonstrations, cooking schools, etc., are needed. Entire industry teamwork is needed, and utilities should furnish the leadership. Leagues and dealer organizations need to be strengthened, and supported.

Individual committee reports follow.

Agricultural Load Building

Steve H. Winter, Sponsor
W. L. Moats, Co-sponsor

The group had interesting discussions on wind machines, poultry feeding, overhead irrigation and lighting for sorting and grading fruits.

Although wind machine load a few years ago was small, one company has experienced a 400% growth in three years and it is estimated that in the southern California system alone it has a potential load of one-half million horsepower.

Discussion of overhead sprinkling was of exceptional interest and the statement was made that the same job can be done with less water, producing better crops, by the use of sprinklers. It was interesting that electric power is considered the most economical way to operate the sprinkler system and by experience it has been found that practically any crop can be sprinkled. Sprinkling companies have competent engineering staffs for layouts and are doing a fine job in engineering jobs throughout the association's area. They also have engineers available for the training of utility personnel.

By an actual demonstration lighting for sorting and grading of fruit and its importance to both the electrical and fruit and vegetable industry was shown by R. H. Ryan. Spoilage of fruit in shipment can be practically eliminated with proper light on the sorting and grading tables. This saves the fruit and vegetable industry thousands of dollars and the employees are able to perform a better job, as well as do more work with proper lighting.

A large part of the association's territory has as its basic industry agriculture, and to many utilities agriculture represents a large percentage of their load. Agricultural production has increased in the association's area from approximately one-half billion dollars in 1940 500% in the last 10 years. It is estimated that in 1950 the value of agricultural production in the association's area was two and one-half billion dollars.

4-H Committee

Elmer Stahl, Chairman

This committee also is one of the babies of the association in that it was only within the last two or three years that the association and/or utilities in the area, particularly in California, have had the wholehearted cooperation of the state agricultural group. Three years ago the electric project, as far as 4-H groups were concerned, was not heard of, and during the past year through the sponsorship of the committee the program included 1,800 farm boys and girls who have completed the electric 4-H project.

The committee has prepared manuals, conducted leader training ses-

Corlett Moats Winter

Long Sherwood Dame

Carlson Tallon

Hartley Adams

Gumz

sions throughout the area, and at present other 4-H groups are stating that the electric project is stealing their members.

The committee heard Louis M. Stark, Westinghouse Electric Corp., who discussed farm youth activity programs throughout the nation. Stark asked those in the electrical industry to approach the 4-H program with a better understanding of youth, its elemental needs, its developmental needs and its functional needs. "If our program satisfies their hunger they will eat it up," he said. As problems he cited that of keeping older ones in the program and, second, that of reducing the paper work to a minimum and giving the actual creative part of the electric projects as high a proportion of the total as possible.

Following his talk a panel, consisting of D. L. Turner, H. C. Rice, T. W. Christensen, R. R. Whittaker, G. H. Sullivan and H. S. Schuler explored various phases of the activity.

The committee suitably rounded out its session with a demonstration of the 4-H electric project in action. This program was under the sponsorship of Frank Spurrier, who presented Jim McCarten and Rickie Stanwood in the demonstration. This was the end product of the committee's activity.

Commercial and Industrial Power Lighting Group
Jack A. Corlett, Sponsor
Leon D. Dame, Co-sponsor

Commercial and Industrial Wiring
Matt Sherwood, Sponsor

Commercial and Industrial Lighting
Charles R. Long, Sponsor

Industrial Power
J. H. Gumz, Sponsor

These groups held a joint session which started on time and ended at 5:45 on Thursday. They were so enthusiastic that they voted to reconvene after the luncheon on Friday.

It is estimated that 50% of the electric utilities' kwh and/or revenue comes from the commercial and industrial customers and actually the groups are of the opinion that they should receive more attention.

Industry employment in the association's area was approximately 10% in 1940 of the total labor force. In the 1950 census it was 14% of the total labor force, which is an index of the industry's growth in the area.

During the group's discussion it was pointed out that the manufacturers of commercial lighting and industrial power equipment and wiring materials are doing an exceptionally fine job in applying the latest techniques. However, when this equipment is received in the field the distributor, dealer, electrical contractor, journeyman, utility representative and plant manager in many instances are not up to date on its installation and maintenance. It is estimated that there are approximately 50,000 manufacturing plants in the association's area. Approximately 40% of these are small plants and have no plant engineer, therefore about 80% of the industry plants have to look to the utility representative, electrical contractor and/or dealer for their factual information on the latest equipment and techniques available. It was also pointed out that machines don't wear out, the process does.

Representatives of maintenance companies who specialize in fluorescent lighting maintenance only were present. They indicated the need for this and other special services to the industrial and commercial customers.

The committee agreed on the following recommendations: (1) That a speakers' bureau be established that would have available competent speakers for groups interested in commercial and industrial wiring, lighting and power; the object would be to keep all groups informed on the latest techniques, availability of equipment, type of equipment available, its use and maintenance, (2) that the directors appoint a commercial-industrial entrance service and wiring guide committee for commercial and industrial establishments, (3) that the group work toward greater participation in PCEA industrial and commercial activity by making an effort for plant personnel, electrical contractors, maintenance groups, etc., to obtain such membership, (4) that the work-type session be continued in order that available information can be exchanged and disseminated throughout the industry.

The group had interesting speakers representing the various segments of the commercial and industrial power and lighting field. At some periods the discussion was heated but everyone benefited from the open and frank discussion of the committee's problems.

Home Economics
Mrs. Pauline Eliker, Chairman
Miss Clara Sherburn, Vice-chairman

"Look, We Have It!—Dramatized Selling"—was the slogan each of the girls wore as they would an orchid, inviting questions as to its meaning. The meaning was found to be in the group's accomplishments:

During the year the booklet "Know Your Electric Range" came off the press and 27,000 copies have been delivered to public schools where it is used as a textbook. This means that the young people are learning about the electric range from the experts.

The committee decided last year that the home economics teachers should be brought up to date on the industry and during the year five Electric Living Institutes for homemaking teachers have been held in the association's area.

The committee realized that dealers, who in the end sell the electrical merchandise to the customer, also needed sales training and, during the past year, several sales training work-

Crump Barnes

Eliker Sherburne

shops have been held in the association's territory.

Because of the interest of home economics teachers and others in the committee's work, the committee has prepared a leaflet describing the PCEA membership to all home economists. It plans to prepare a booklet on the home freezer similar to the "Know Your Electric Range" booklet. This will be available for both customer and school use.

The home economics committee, at its meeting, agreed to establish a job placement section for finding home economists and also for finding jobs in the industry. A chairman has been established for both the north and the south.

It is of interest to note that this committee, one of the babies in the association, analyzed the problem, solved it and goes on to the next one.

School Lighting Committee
Ralph Crump, Chairman
J. E. Barnes, Vice-chairman

School population in the association's area is up approximately 40% in the last 10 years with the largest kindergarten classes in the history in the area, starting the year 1952. It becomes obvious that furnishing schoolrooms for the areas of increasing population is a major problem. It has been estimated that there are approximately 50,000 classrooms in the state of California alone, and that approximately 30,000 to 35,000 of these are inadequately lighted according to accepted standards. Governor Warren estimated that approximately 5,000 new school classrooms would be needed annually for the next few years.

The school lighting committee approached the subject from the standpoint both of daylighting of schools and electric lighting. Charles E. Gibson, State Department of Education of the Division of Schoolhouse Planning, pointed up sharply that there is no difference in the goal to be achieved either with daylight control or with electric lighting, it is the total environment in the schoolroom that is the goal. Windows to admit light, air and sunshine serve a dual purpose and are necessary. Brightness-balance is more important than high foot-candle level, while architects have based their school building designs on daylighting and in some cases have introduced brightness far beyond the tolerable limits. He enumerated the considerations that department places before school boards in determining proper classroom design and in seeking to coordinate all the factors necessary for human comfort and efficiency.

F. J. Rohring, Southern California Edison Co., reviewed the standards in the IES Handbook for recommended school lighting practice. C. M. Thompson of San Diego Gas & Electric presented results of surveys showing the trend in school lighting in southern California. He summarized that: (1) Schools are being designed for maximum use of daylight; (2) electric lighting is being installed as a supplement to daylight; (3) brightness control is definitely needed for north windows; (4) reflection factors of room surfaces are pretty well accepted.

It was generally felt that the practices in northern California as presented by J. E. Barnes were similar. Walter Alden reviewed the equipment design progress and L. A. Hobbs, Smoot-Holman Co., a member of the lighting industry advisory committee to NPA, told what the priorities and supply situation was.

Residential Wiring Committee
E. W. Meise, Chairman
G. F. Black, Vice-chairman

A panel discussion opened the Thursday morning session. On it were Miss Francis Armin, National Adequate Wiring Bureau, New York City; W. E. Cranston, president of Thermador Electric Mfg. Co.; A. C. Veit, Los Angeles County electrical inspector and past president of IAEI; John Strickley, coordinator vocational training, Los Angeles schools; and R. G. Fuller, assistant vice-president and chief appraiser, Bank of America. Essentially, the points made by each were as follows:

Miss Armin — Some districts are making an effort to sell adequate wiring in old homes through FHA Title 1.

Cranston—The entire industry must be in back of the program to insure its success. At present only 2 or 3% of the building dollar is going to the wiring system. A study should be made of the diversity of load.

Veit — More advertising is needed to go to the homes to acquaint customers with what can be done with electric servants and thus create a demand for service to them.

Strickley—Training program is now in progress for both electricians and the public. Wiremen must be prepared to sell customers on an adequate wiring job as well as the contractors. It is a job to serve for all time and all purposes.

Fuller — The average appraiser knows least about wiring and welcomes education from the industry. The lender is vitally interested and the appraiser must thoroughly understand the importance of adequate wiring. Ninety per cent of the loans are in the residential field.

At the afternoon session, Victor Soper acted as discussion leader and recommended that the association write letters to NEMA adequate wiring committee, with copies to various NEMA sections, recommending that the manufacturers of appliances carry the adequate wiring key in their national advertising.

Most of the afternoon was taken up in discussion of the year's objectives, which are: (1) To promote better wiring in speculatively built homes; (2) to develop a check list for use of the builder to show appliances that should be included in a home and the circuits necessary to serve them; (3) to develop a plan for working with apprenticeship programs, and instruct the apprentices and journeymen on how to promote and install better wiring; (4) to develop a plan for the distributors to promote the sale of adequate wiring to their personnel and their electrical contractor customers.

One utility reported that by capitalizing the wiring to the meter socket, it was able to get the size of service necessary. It was significant that with this they had increased the kilowatt-hours per customer from 1,500 to 4,000 since the war.

Home Lighting Group
Maurice Tallon, Sponsor
Walter Carlson, Co-sponsor

At a meeting of this committee some two or three years ago it was proved that the average cost of lighting fixtures in a speculatively built home was running in the neighborhood of $15 to $20. At that time the committee decided to do something about it.

The most successful plan that has been developed by the committee and the industry has been the model home—approximately 20 of which have been constructed in the association's area in the last year. Through this program of demonstration the booklet "Seeing Your Home in a New Light" has been sold to hundreds of thousands of people who have actually seen the equipment installed. The program has been extremely successful in that the speculative builder has found by actual experience that he can sell good home lighting and as a result several large speculative developments have included good home lighting as a sales promotion.

Maxwell Rosen, Incandescent Supply Co., indicated that fixture manufacturers are making equipment that meets the adequate lighting standards, wholesalers are beginning to stock these and furniture dealers have shown great interest because the correct lighting shows up home furnishings to better advantage. Light conditioning can be used to sell adequate wiring, electric kitchens, furniture and the home itself.

A speakers' bureau is being set up in southern California to furnish speakers for service clubs and schools. A home lighting group in the Los Angeles Electric League is doing some active promotion. The Fred Waring show will also feature home lighting over a national television hookup.

Kitchen and Laundry Group
Howard Scaife, Sponsor

The kitchen and laundry group, as well as the adequate wiring committee operating separately, all arrived at practically the same answer to their problems. With approximately 75% of the U. S. families earning less than $5,000 and with a large percentage of new homes in the association's area being built by speculative builders, it is obvious that the industry must do something to sell its goods and services to the speculative builder as well as the individual builder of a modest home.

To do this the feeling was that: (1) Personal contact with home builders and speculative builders be increased (2) construction of model homes be encouraged, each to have adequate wiring, proper lighting and modern kitchens and laundries with the electric equipment installed; (3) it sell the 3-in-1 package of wiring, lighting, and kitchens and laundries, and then work with FHA and other lending agencies to get liberal financing over a long period of time; if possible, tie the financing into the real estate loan.

This group also discussed at considerable length the dimensions of electrical appliances and what is being done within the industry to standardize.

Television Committee
J. Clark Chamberlin, Chairman
W. E. Lind, Vice-chairman

A packed house and an extremely interesting discussion from the leaders of the television industry, broadcasters, network representatives, service groups, made the television committee sessions the chief center of interest of the annual conference. Outside and industry experts taking part in the informal discussion included Don Fedderson, general manager, KLAC, and president, TV Broadcasters Assn.; Don Norman, TV Station KNBH; Robert Stratton, FCC; George Irwin, president, Irwin Co. Inc.; Frank K. Runyan, president, Western Merchandise Mart and San Francisco Better Business Bureau; Robert Sample, vice-president, Los Angeles BBB; George Korntved, president, Service Inc.; Larry G. Borgeson, district manager, RCA Service; Mike Gribin, Universal Television Service; John Fesko Jr., district television service supervisor, G-E Co.; A. B. Sherwood, G-E Supply Corp.; Don J. Johnson, radio and TV service manager, Wesco; Raymond White, claims and accident attorney, PG and E; Ted Van Law, Southern California Edison Co.; and managers of leagues, LeRoy Bennett, Northern California Electrical Bureau; Glen Logan, Electric League of Los Angeles; George Cane, secretary, Sacramento Electric League; and J. Clark Chamberlin, San Diego Bureau of Home Appliances.

The group discussed present and future advertising, entertainment and educational possibilities of TV and technical developments taking place, probable place of UHF. Doubt of UHF profit possibility was expressed for already well saturated markets because of expected resistance of present set owners to acquiring converters.

Television merchandising practices were assayed to see what could be done to keep the industry's house in order and avoid public criticism and adverse legislation. More careful screening of television retail outlets was urged to eliminate dealers who habitually misrepresent products or services in advertising. Growing cooperation of newspapers, radio and TV stations in attempting to control advertising abuses was noted. Cooperation between legal departments of the cities and Better Business Bureaus was observed. A need to continue public relations policy that will present the television industry to the general public in a more favorable light was expressed.

Installation and maintenance developed intense interest because of the explosive position of this phase of the industry in the public's opinion. Testimony showed that TV service agents have made little or no money from service, yet the public feels that it is being gouged. "Fix It Yourself Books" and questionable warranty plans drew the unanimous conclusion that there is badly needed a program of public education, that television maintenance costs are totally unrelated to those of radio, automobiles or other products because of the complexity of the receivers.

Threatened legislation, such as Assembly Bill No. 26, calling for licensing of TV and radio repair organizations, were discussed and opinion differed as to the ultimate value of license control. The committee urged a study of legislation and of hazards and liabilities of improper installation. Gradual deterioration of existing antenna and danger where adjacent to power lines calls for closer study and better installation practices.

Technical training for TV maintenance personnel, training programs beyond those available now, must be developed in order to maintain technical forces required during coming years. Weaknesses seem to be that long experience is necessary to obtain proficiency, and prevailing pay is well under that of other trades requiring less skill and training. The public's critical attitude toward TV service men is not conducive to a feeling of morale. Employers need to develop improved techniques in service and installation operations, with better tools and equipment and more interest in the training program. It was even suggested by Runyan, who is a member of the State Prison Board, that training for rehabilitation of some who are to be released from prisons would be a worth-while project.

This committee's bulletin is distributed to dealers in the area to keep them accurately informed.

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Enforced vacation

Spring has brought its customary remodeling, repairing and small-addition construction business but regular building has been slow to start even with easing of metals controls. A carpenters' strike that began in the San Francisco Bay area spread over northern California and shut down most building in progress for as much as three months, cutting electrical contractors to small repair and maintenance business and idling more than half the union members to the bench. Wage increases don't buy food when there's no work. At press time the carpenters' strike had ended and activity on many projects had reawakened.

Like the groundhog

As controls eased a number of plans being prepared by architects and engineers emerged from their offices for bids and others deferred by business firms were given a go-ahead signal. A huddle of economists recently came up with a general opinion that business would continue "good-to-better" the rest of this year although they look for some "downward adjustments" in 1953. That is the general outlook.

Credit again?

Although credit restrictions on appliances and autos were removed those on house building were still on at press time. However Business Week predicted that these too would soon be lifted. That could mean a spurt of new house construction again.

Taking stock

NECA District 8 will be holding its annual conference at Colorado Springs June 13-14. It is partly a joint meeting with IBEW locals covering the same Rocky Mountain areas of Montana, Idaho, Utah, Colorado and Wyoming. NECA District 8 Vice-president Ralph E. Johnson and Wallace Wright, IBEW vice-president, will preside at alternate sessions. Full report will appear in the July issue, even as District 6's conference at Santa Barbara is to be found in this issue, p. 126. Very vital questions to all contractors were discussed and are reported for you.

All at once

So many meetings took place last month that reports of some must be held over until next issue, among them the series of inspector meetings which Bob Peterson, IAEI technical assistant secretary, attended; the industry meeting at Yakima at which it was decided to prepare a permit fee only amendment to the Washington state electrical law and the Washington State Electrical Council was set up for it; code classes conducted by the renamed Electrical Contractors of Washington; and many local meetings of associations in the industry.

Show dates

Two expositions of interest to many contractors are: 1952 Western Electronics show and convention at Long Beach municipal auditorium, Aug. 27-29; and the 1952 Home Show put on this year at Hollywood Park, Inglewood, by the construction industries of southern California, among them the Los Angeles Chapter, NECA, and Los Angeles Electric League, Aug. 22-Sept. 1.

Promoted East

Sam Hazelton, illuminating engineer for General Electric Lamp Department at Oakland for almost 15 years, is being transferred to the New York district as supervising engineer. He will leave in late July or early August.

Pioneer motorman

Well-known in the motor shop field for many years, J. O. Case died, May 6, aged 72. He was one of the first graduates in electrical engineering from Throop College, now California Institute of Technology. For 17 years he was district manager for General Electric Co. In 1931 he and a group purchased Quality Electric Co., from which he retired in 1949 when it became Quality Television Co. He was one of the founder members of Los Angeles Electric Club.

Reel soon

Please return those wire reels, the wire and cable manufacturers plead. The shortage is making it hard for them to make deliveries of also hard to come by wire and cable. Contractors are asked to look out over the back

lot for empties and, in cases where reels are nearly empty in the stockroom, coil up the remnant and send back the reel.

Overflow production

Columbia Electric & Mfg. Co. of Spokane is moving its war production orders into a new 200,000-sq-ft factory just being completed near Felts Field, Spokane. That will leave the old plant free to give its all to lighting fixtures, for which it has some pretty large orders. It made a sensation with its display at the Cleveland Lighting Exposition, featuring a new basic fixture with interchangeable reflectors.

Cutbacks on motors

General Electric had to cut back approximately 20% at its San Jose motor plant because the normal buying season for motors in deep-well pumping, refrigeration and food processing has not developed. Heavy rains, lessened pumping need and strikes made for public buying uncertainty.

New Spec' sheets

RLM Standards Institute has just revised its standard specification book and the edition is now off the press. It contains two new officially approved specifications, important revisions and clarifications of older ones and new tables of utilization coefficients and distribution curves. Copies may be had at 326 W. Madison, Chicago 6.

Cold Cathode labeling

First to certify its lamps the makers of cold cathode lamps in the Fluorescent Lighting Assn. announce that Chicago Electrode Laboratories; Cold Cathode Lighting Corp; Swedish Iron & Steel Corp.; Voltarc Tubes Inc.; Colonial Electric Products Inc.; Pollak Luminescent Corp.; Aladdin Lighting Corp.; and Pittsburgh Outdoor Advertising Co. production of lamps are tested and certified and bear the FLA label.

Blindfold test

By assembling and disassembling its Life-Linestarter motor controls while blindfolded, Westinghouse salesmen are demonstrating the design characteristics that make them easily maintained or repaired.

New-old name

"Pittsburgh Standard" has been the trade name of Enameled Metals Co., makers of conduit, but now it will be company name as well.

High point sources

Two new high-intensity point-source lamps of unusual design that were developed by Western Union engineers will be manufactured and distributed by Sylvania Electric Products. One is a concentrated arc lamp using a film of molten zirconium metal, giving a color temperature of 3,200° K, in conventional glass bulbs, in wattages from two to 300. The other is called Telcoarc, and operates in open air without a glass bulb. It uses two zirconium oxide electrodes; develops color temperature of 3,600° K. Fields of use will be in projection of various kinds.

Forced air heaters

A compact little forced air electric heating plant for homes, stores, offices and industrials has been put on the market by Kilbury Mfg. Co. of 14529 Hawthorne Blvd., Lawndale, Calif. It comes in three models, a basic model, a cabinet model and one like a furnace for use with air ducts. Kw inputs are either 9, 11.7 or 13.1, and they can be run off either 440 or 230 v, single or three phase. They are UL listed.

Adjustable also

Fostoria Pressed Steel Corp. now makes a local lighting unit, designed for sewing machines in garment plants, but useful in many other industrial applications. It employs two 4-w fluorescent lamps, yet gives as high as 500 f-c on the work. Special ballasts can be used for 90-v or even 8-v operation; normal operation is 118-v.

Starter showings

Arrow-Hart & Hegeman Electric Co. recently held showings throughout the West for the trade of a line of motor controls made by its industrial control division.

Handy gimmick

Plaster ears that can be used to adjust electric fittings in outlet boxes that are set back in tile, concrete or plaster are made by Ringmaster Corp., 2437 Riverside Drive, Los Angeles. They are simple metal plates but can save lots in labor and callbacks to reset wobbly switches. F. L. Hockensmith is southern California representative.

Honored also

John Allen Ware of Los Angeles was one of the Guth representatives who won a prize and were honored at the recent Guth Golden Anniversary sales conference. Some 40 new designs of fixtures were introduced.

Figuring labor

In adjusting prices under CPR-93 to the new higher wage scales, you can add only the increased wage, plus increased insurance, pension and other costs, but not markup for profit. Also—file on Form 102 with OPS.

ELECTRICAL WEST

Sales Guide

News Letter

June 1952

FOR THE ELECTRICAL MERCHANT OF THE WEST

Except for home freezers, riding the wave of food plans, the appliance and radio-TV business has not been making any records lately although many note a seasonal improvement after a hard winter. Even TV cannot be blamed by white goods, for TV isn't setting any fires in sales. The national political conventions next month are counted on to boost TV sales again and summer to pep up refrigerator and freezer volume. Campaigns on ranges and housewares by leagues and utilities are designed to get these appliances off the ground too. It all looks like work.

In a word

Room air conditioners are getting a big play this year as the number of companies making and advertising them increases. Latest entrant is Gibson, which celebrated its diamond jubilee by announcing a room air conditioner of 3/4 hp selling at $379.95 for 115 v, $389.95 for 230 v, cooling, filtering and dehumidifying air in a room of 400 sq ft. . . Remington Corp. has appointed Westinghouse Electric Supply to distribute its air conditioners in Los Angeles, Phoenix, Salt Lake City and Boise. It boasts of several mass sales to hotels, housing projects for industrial plants. . . General Electric sold both packaged air conditioners and gas-fired furnaces to 210 houses in a Texas project of small $12,500 homes. . . G-E is even molding the plastic cases for Philco's window-type air conditioner units. . . Mitchell Mfg. Co., one of the most active in selling this new market, has 1/3, 1/2, 3/4 and 1 hp models, an exclusive Weath'r Dial and many sales aids, such as a Weath'r Dial carrying case to use in home calls. Ingeniously it has sold air conditioners through Kissell Refrigeration Co. of Inglewood to a hatchery in Riverside. Has appointed N. O. Nelson Co. of Pueblo, Colo., as a distributor. Made Sears Roebuck & Co. a national dealer. . . RCA enters the appliance field with this air conditioner and has been carrying national magazine ads. . . Quiet-Kool room air conditioners are distributed in southern California by C. G. Hokanson.

Cool cash-in

Removal of Reg. W was made to restore sales to the auto and appliance industries, both of which had surpluses. A wave of No-Money-Down ads have appeared all over the West but by itself that only unleashed a few deferring buyers. Despite figures on savings in the banks, the public is cautious about spending because of high living costs.

Not an obstacle

Fair Trade got the O. K. of the House and hearings were to start in June before the Senate. The McGuire bill aims to restore to the states the right to regulate resale price maintenance even to the nonsigners. McGraw Electric Co. came out strongly with "Toastmaster States the Case" that it circulated to Congress.

Fair to warmer

Many heads and shoulders-to-the-wheel are better than one and thus smart dealers will join in with and share the results of joint promotional programs of bureaus, leagues, associations and utilities. Here are some going on or going-to-be in various regions--

To build sales

In Arizona the Appliance Merchandisers Assn. is winding up an electric range campaign headed by Bill Constance of Wesco and Hubert Davis of Arizona Wholesale Supply, and refrigerators and freezers are next. Milt Evans of Arizona Wholesale and George Prescott of Dorris-Heyman are co-chairmen on this campaign. In the February-March freezer drive 750 were sold; 100 during the session of a freezer show that drew 10,000 attendance. Evaporative coolers were featured in April.

One a month

Utah Power & Light is doing something about home lighting. It has built a traveling light-conditioned room, giving its own employees and their families the first pitch to get them boosting, then dealers and salespeople who sell lamps in each division. See next month's story.

Let there be light

Inland Empire Electrical League has dealers in the Spokane area and distributors alerted to a big two-feature campaign on both electric housewares for gifts and electric ranges. Big section in the newspapers, product ads to back it up, dealer display material, cooking schools and a "how to demonstrate" class in most towns for dealer sales people are part of Chairman Russ Williams of Sunset Electric's appliance committee. Meanwhile the supply and apparatus section is ready with a commercial and industrial air conditioning program.

Gifts and cooking

In Utah and eastern Idaho the Intermountain Electric Assn. has started an unusual electric range campaign aimed at the nonusers. Dealers get from the association a package with 100 names and addresses of users of coal, gas or oil for cooking, as well as display material and letters to these prospects, inviting them to come in for a contest blank and a demonstration to aid them to win. They write, "I would like to cook on a matchless electric range because--" in 50 words or less.

Aim at nonusers

In Yakima the Pacific Power & Light Co. has started a door-to-door survey of all of its customers to bring its data up to date on appliance usage and needs and will then be in position to initiate dealer campaigns to promote the sale of appliances and electrical services.

Back in action

Hawaiian Electric Co. is stimulating dealer sales by offering free wiring for electric ranges and water heaters and is supporting the proposition with large newspaper ads telling why electric is best.

Incentive

With Electrical Living Month behind it, and a novel two-weeks table setting contest just accomplished, the Northern California Electrical Bureau is now actively planning for the Western Living and Home Exposition in San Francisco Civic Auditorium, Sept. 27-Oct. 5, in cooperation with the Associated Home Builders and the Gas Appliance Society. The table-setting contest drew several thousand women to the PG and E San Francisco office on Sutter Street to see table settings by Mrs. Earl Warren, the governor's wife, a number of women's clubs and groups, and to see, alongside, demonstrations of home appliances. Chances for each to win an appliance of her choice brought excellent response. Peninsula Appliance Dealers Assn. plans to stage a television and home appliance show in August. The date and place has not been decided, it may be either in Palo Alto, Redwood City or San Mateo.

Many and varied

In El Paso Electric area dealers and utility have been conducting a "Win with Reddy" electric range and water heater promotion.

Election feature

Many in violation

In California, because of the Contractors License Law, an electrical dealer cannot legally contract for the installation of a complete electric kitchen unless he holds a C-10 electrical contractor's license and a C-36 plumber's license, etc. To enable dealers to offer customers the full service of a complete job installed the Los Angeles Electrical League has contacted the Contractors State License Board and an agency form has been approved which, when signed by the customer, permits the dealer to engage licensed craftsmen to make the installation. The dealer then can quote an installed price and even carry the paper on the total as the agent of the customer. . . The League has held regional meetings of its retail members lately in order to facilitate attendance in various parts of extended Los Angeles. Its lighting division has provided dealers with window streamers that urge "Light Condition Your Home" and has an education program under way.

Briefing

Down San Diego way there's been a food-freezer clinic in May attended by over 60 dealers and distributors to brief themselves for the selling drive this summer. The Bureau of Home Appliances also held a TV interference clinic. It plans its fall conference as a celebration of 20 years of growing and successful promotion for the trade at Coronado Sept. 26. An electric range campaign is now under way.

Washing is complex now

The Electrical Women's Round Table in Seattle recently held a soap and detergent conference in cooperation with the University of Washington to which 45 home economists and saleswomen came to learn from soap and detergent manufacturer people the low-down on washing. In Portland a similar seminar on soaps was scheduled for June 5-7, the PGE, Oregon State College and appliance distributors participating.

Housewares ahoy!

A Northern California Electrical Housewares Group has been formed in San Francisco to push a campaign on electrical housewares during June and July, with special emphasis on the brides. PGandE tied in with big newspaper ads and window displays. Distributors held sales training sessions with dealers and supplied sales helps, NEMA material and offered window display prizes.

Flash

Sacramento has just concluded a very successful Electrical Home Show sponsored by the Sacramento Valley Electric League. The three-day show drew more than 7,000 and dealers report good selling.

TV tie-in

Westinghouse is offering special package deals on appliances as a tie-in with the company's "Band Wagon" promotion of the national political conventions over TV. These specials are offered to build traffic and sell housewares, fans and cleaners in a drive starting July 1.

Big name changes

Jim Nance's surprise departure from Hotpoint to become Packard Motor Car president (rumored to be to merge Packard with Nash-Kelvinator) and Edward Taylor, Hotpoint market vp, going to Motorola as assistant to the president has caused some far Western changes too. Howard Scaife, Western regional manager, now goes to Chicago in a new job and "Buzz" Koch succeeds Scaife in the San Francisco headquarters job. John Sharp, vice-president and chief engineer of Hotpoint, becomes new president, general manager and director.

In this changing world

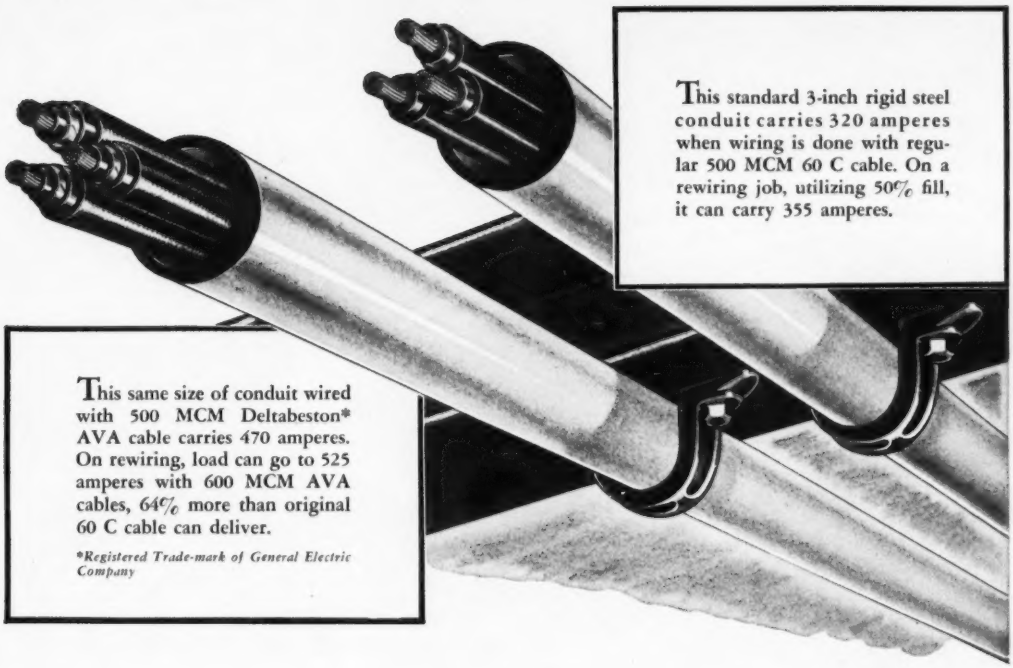
Distributor changes lately include: Admiral set up Golden State Appliance Distributing Co. in San Francisco, at 274 Brannan St., with Harold D. Conklin, former regional manager, as vp and gm, and John Barker of Free-Westinghouse as general sales manager. . . Hoffman Sales Corp. has given way in San Francisco by appointing McCormack & Co. as northern California distributor; Max Hoff as distributor in the Ventura, Santa

Clara and San Luis Obispo counties; and Electrical Distributors Ltd. in Honolulu. . . Leo J. Meyberg Co., San Francisco, has been named distributor for Wilson Refrigeration Inc., which includes Los Angeles and Fresno too. . . Lloyd Sutton, Western regional manager for the new Universal Major Electric Appliance Co., has appointed Gold E Distributors of San Diego and Sentinel Radio Corp., Los Angeles, distributors. | continued

Among people, these shifts have been made: James McKay, formerly appliance sales manager in Portland for Graybar, is now Northwest districtadvertising and sales promotion manager in Seattle. . . Robert M. Bourgette has been appointed Deepfreeze zone manager in Seattle. He was formerly with Poole Electric Co., Seattle dealer. Address is 1818 N. 43rd St. Robert Harnish, Deepfreeze Western manager, has moved his office from the Merchandise Mart, San Francisco, to 625 30th Ave., San Mateo. . . Jim Scales is now advertising and sales promotion manager for W. J. Lancaster Co., Motorola distributor. He was with Zenith and prior to that gsm at L. J. Meyberg Co. . . Robert B. McKnight succeeds W. B. Loeber as Western regional manager for Nesco Inc., with headquarters in Los Angeles. Loeber moves to Chicago as manager of the Premium division. . . W. Karl Ostler succeeds Henry Muller as Oakland branch manager of Westinghouse Electric Supply, and some change is going to be made in the Salt Lake City branch where John Longdon has taken on a Mormon church executive position. . . Westinghouse Electric Supply has appointed W. P. Frost, formerly of Packard-Bell, as radio-TV sales manager of its Vernon branch. . . Frank Dunn has been made Northwest sales promotion manager for Westinghouse Electric Corp. appliance department, succeeding F. L. Meredith who is now appliance specialties manager. . . Thomas E. McKittrick has been promoted to credit manager of Dallman Co. as Lloyd J. Kahrs moves up to manager of operations of the San Francisco branch. Edgar Cabron becomes assistant credit manager. . . K. E. Langwith is now divisional service supervisor for Western distributors of Bendix Home Appliances in Billings, Denver, Portland, Salt Lake City, Seattle and Spokane. . . J. T. McAllister is Hoffman factory service manager now; was formerly with RCA; and E. A. Tischler joined Hoffman as publicity director and Donald E. Larson becomes advertising director, Roy D. Soderlind becomes sales promotion manager. . . Milton L. French was made zone service representative for Youngstown Kitchens to work with distributors in Fresno, Billings, Portland, Seattle, Spokane, Denver, San Francisco, Reno and Salt Lake City, with headquarters in Fresno. . . J. R. Jones & Associates became sales agents in San Diego and Imperial counties for Kaye-Halbert TV, which set up a service branch in San Diego also. | People do move

Denver and Portland are first on the list issued by FCC giving the order in which applications will be heard for TV licenses. Other cities in the West are well down the line. . . A CBS engineer estimates the minimum cost to put up an UHF station is $199,550; a VHF station $111,000 in a low band, $116,950 in a high band. . . NPA is expected to lift its ban on materials for color TV production. It has been under pressure from Paramount Pictures Corp., which controls the Lawrence tricolor tube. . . California State Dental Assn. saw oral surgery techniques on 18 Philco TV sets supplied by Dallman Co. Thus 4,000 dentists were able to "look over the shoulder" of the dentist doing the job. | TV in short

Price reductions were announced by Frigidaire on six refrigerator models of from $15 to $45 and on four ranges from $7 to $18; washer $10 and dehumidifier $20. . . Whirlpool made a cut of $20 on its automatic washers; $24 on dryers were previously cut. . . Fedders-Quigan Corp. made a $20 cut on two air conditioners to $229.95 for a 1/3-ton unit, and $329.95 for one with automatic comfort control. | Official drops



This standard 3-inch rigid steel conduit carries 320 amperes when wiring is done with regular 500 MCM 60 C cable. On a rewiring job, utilizing 50% fill, it can carry 355 amperes.

This same size of conduit wired with 500 MCM Deltabeston* AVA cable carries 470 amperes. On rewiring, load can go to 525 amperes with 600 MCM AVA cables, 64% more than original 60 C cable can deliver.

Registered Trade-mark of General Electric Company

Which conduit carries more current?

Whenever you add distribution or change existing wiring systems, investigate the savings of Deltabeston AVA cable. Deltabeston can actually offer more current per pound of copper — can pack as much as 64% more current into your present raceways.

Because it's built to beat the heat with a double asbestos insulation and the famous G-E No. 1799 varnished-cambric—Deltabeston cable can take elevated temperatures in its stride. Thus, it can handle more current than ordinary types *at normal ambient temperatures.* And non-aging asbestos insulation offers the extra advantage of long service life.

Whenever you wire, look into the advantages of Deltabeston AVA cable. For further information see your local G-E Construction Materials distributor or write Section W5-625 Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

Deltabeston
WIRES and CABLES
Built to beat the heat

You can put your confidence in—

GENERAL ELECTRIC

Meeting the Nation's Growing Power Load

Greater System Capacity through new and higher Breaker Ratings

Heavy-power concentrations and extensive system interconnections have created demands for circuit breakers with unprecedented characteristics and ratings. Yesterday 10,000,000 kva for 230,000 volts looked like the ultimate . . . today we are approaching 15,000,000 kva. Westinghouse has developed and already has installed other new and higher ratings for a wide range of voltages.

What's the meaning of these new ratings? Higher voltages will carry larger power blocks more economically. Higher interrupting capacity makes greater concentration of generation or of transmission lines at one location possible. With the same system stability, extra transmission lines and current-limiting reactors are eliminated.

Westinghouse started getting ready for these new interrupting peaks 27 years ago, when the High-Power Laboratory was created. The facts gained from thousands of short-circuit tests . . . proving ratings as high as 10,000,000 kva . . . have enabled us to reduce breaker operating time, size, and amount of equipment to do the job.

It's another example of Westinghouse thinking ahead. It's an awareness of all utility needs . . . keeping breaker capacity, for example, in step with system expansion, so that your investment in generating and transmission facilities can be protected. With the realization that America's power appetite is growing, marches our responsibility to build apparatus . . . that is more efficient, economical and reliable. J-97162

YOU CAN BE **SURE** . . . IF IT'S

Westinghouse

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

New ratings available

Since 1945 Westinghouse has developed the following new circuit breakers:

34.5 kv, 2,500,000 kva
69 kv, 3,500,000 kva
115 kv, 3,500,000 and 5,000,000 kva
138 kv, 5,000,000 and 10,000,000 kva
161 kv, 5,000,000 and 10,000,000 kva
230/196 kv, 10,000,000 kva

Westinghouse is the first company to build and have installed 161-kv, 10,000,000-kva breakers. 230-kv, 10,000,000-kva breakers already have several years of field experience. Westinghouse also will soon deliver a substantial number of 138-kv, 10,000,000-kva breakers.

Westinghouse also has converted existing breakers to ratings of 10,000,000 kva by changing to new interrupters . . . extending the useful life of present equipment.

New pneumatic mechanisms

Modern power requirements call for high-voltage circuit breakers capable of initial reclosure in 20 cycles or less. The newly developed Westinghouse pneumatic-operating mechanism combines high-speed reclosing with mechanically trip-free opening so that the breaker cannot be held closed after a tripping impulse has been given. Further, latches are reset so rapidly that subsequent reclosures are possible after intervals only a little longer than the initial reclosure.

New surge-tank development

High-current arcs manifest themselves as shock waves inside the tank. To reduce the impact on the bottom of the tank and the foundations, and to eliminate rebound, surge tanks are mounted in the breaker to absorb the shock. Here again, Westinghouse engineering development and testing make higher ratings possible.

Chronology of breaker developments

In 1930, the original "De-ion®" grid reduced breaker opening time from 30 cycles down to a new standard of 8 cycles. The Multi-flow grid in 1940 made higher ratings possible and reduced standard opening time to 5 cycles. The extension of the Multi-flow grid principle has resulted in smaller sizes, lower oil content and higher interrupting ratings, and faster opening times down to 3 cycles.

To learn how these new developments can help you, call your Westinghouse Electric Utility representative . . . or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

THE MONTH IN BRIEF

Arizona Units on Line at Hoover Plant

Two 82,500-kw units in the Arizona wing at Hoover power plant were dedicated recently as part of the USBR's Golden Jubilee celebration. The two new units will provide about 30% of Arizona's electrical energy. Cooperation of private utilities in helping acquire facilities to bring Hoover Dam power into Arizona was cited by Governor Howard Pyle, who praised the work of the late J. J. Dougherty, Phoenix attorney and father of the Arizona Power Authority (which handles Arizona's share of Hoover power), and of Henry Sargent, president of Arizona Public Service Co. During a four-day Golden Jubilee excursion in Arizona, USBR Commissioner Michael W. Straus also took part in dedication of the Wellton- Mohawk irrigation project and rededication of Roosevelt Dam, the bureau's first completed major project.

Letters Exchanged on Nevada's Power Request

Reopening the question of transmitting Central Valley power from California to Nevada, A. J. Shaver, chief engineer of the Colorado River Commission of Nevada, wrote to USBR officials in Sacramento asking a yes or no answer to the state's request for CVP power. The bureau in turn asked for further information from Nevada. It wants to know if Nevada can assure that preference provisions of the reclamation law would be met; whether Nevada could use CVP power at varying supply available and whether arrangements can be made to transmit the power to the state. The USBR letter pointed out that getting the power to Nevada involved a complicated exchange among facilities of the bureau in northern California, the Pacific Gas and Electric Co., Southern California Edison and the Colorado River Commission. PG and E already has rejected any such arrangement.

Washington PUD Proposes Columbia Dam

Grand County PUD of Ephrata, Wash., has announced plans for a $250,000,000 hydro development on the Columbia at Priest Rapids, about 25 miles east of Yakima. Congress has authorized the Corps of Engineers to build a dam at the Priest Rapids site but has appropriated no funds, pending completion of McNary and Chief Joseph Dams. The PUD has started condemnation proceedings against property at the dam site and has announced that it will apply to FPC for authority to proceed with construction plans. Glen A. Smothers, manager, said that bonding companies have assured him the project can be financed, if contracts to sell power are obtained. He also said that Bonneville Power Administration has given its support to a PUD proposal that the Bonneville Act be amended to allow BPA to purchase all surplus power from the plant. The proposed dam would be 550 ft high and probably would have an initial installation of 1,240,000 kw, with ultimate of 1,620,000 kw. The Priest Rapids developments proposed by the Engineers and the PUD have one essential difference. The PUD dam would be for power production only; the federal development would provide flood control as well.

Second Plant Scheduled at Redondo

Southern California Edison Co. will start construction of a second plant at Redondo steam station in midsummer, it was announced late last month by Harold Quinton, executive vice-president. Completion of the first of two 156,250-kw generating units is planned for the spring of 1954. Present section was completed in 1949; has 288,000 kw in four units. Cost of the two plants and six units will be about $80,000,000.

New Seattle Rate Schedule Approved

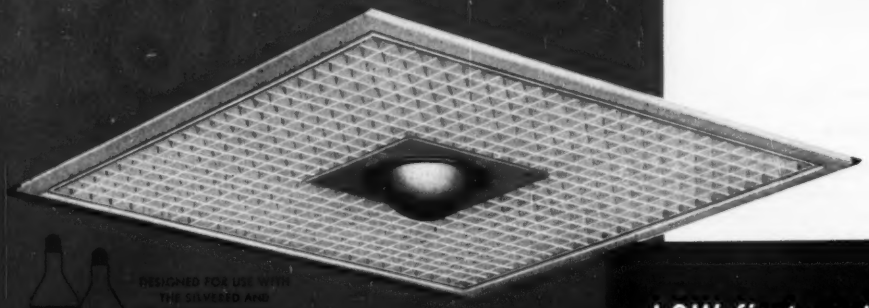
Seattle City Light's new rate schedule (EWEST, May, p. 129) was approved unanimously by the city council and will become effective July 1. More than 175,000 residential and 25,000 commercial customers will benefit an estimated $1,000,000 a year. Standard residential customers now paying 3.2c per kwh for the first 60 kwh and 2c per kwh for the next 140 will pay 3c and 1.9c. All-electric rate customers now paying $5 for the first 400 kwh will get 450 kwh for $5. (According to Superintendent E. R. Hoffman, this will make Seattle's residential rate for 450 kwh the lowest in the United States for cities of 50,000 population or larger.) Electric house heating customers now paying 1.8c per kwh for all consumption over 1,200 kwh per month during the heating season will not pay the 1.8c until their use exceeds 1,400 kwh or a base one and one-half times the monthly average for the two lowest consecutive bi-monthly consumptions, whichever is greater. Purposes of the new rate, Hoffman said, are to pass on some of the savings resulting from purchase of the Puget Power system; to simplify rates; to encourage consistent use of electricity throughout the year.

PUD Proposition Wins

A proposition to put Shasta Dam PUD near Redding, Calif., into the business of distributing power to domestic customers was favored 197 to 147 at a recent election. At present the district serves only a few commercial users and Pacific Gas and Electric Co. serves domestic and street lighting loads.

Trolley Coach Operations Show Gains

A 132% increase in the use of trolley coaches in the past decade is reported by Westinghouse engineers. At the end of 1950 there were 6,504 in use, compared with 2,802 in 1940. Trolley coach systems have shown net incomes of $10 million in each of the last years, while city bus operations have had losses of $3 million to $13 million per year in the same period.



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LOW brightness!

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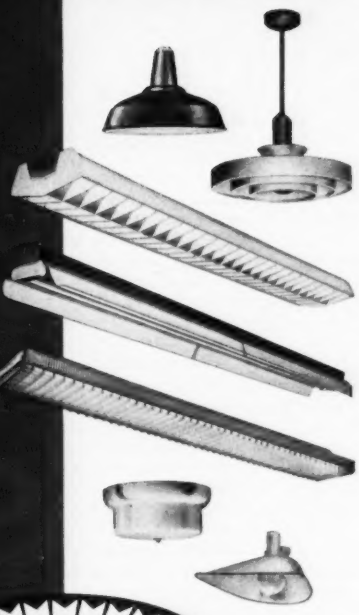

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THIS MONTH'S NEWS

Trinity River Report Sent to States

A Bureau of Reclamation proposal to use presently wasted surplus waterflow in northern California's Trinity River to provide additional water for the Central Valley Project and power for the north and central regions of the state has been sent to federal agencies and California and Oregon state officials for review, Secretary of the Interior Oscar L. Chapman announced last month.

The project would provide an additional million acre-feet of water and, with firming energy, more than 1.6 billion kwh of electricity anunally. The review by state and federal agencies precedes its submittal to Congress.

The multiple-purpose project, which would also provide increased recreational opportunities and fish and wildlife conservation benefits, would form a newly established Trinity River Division of the California Central Valley Project and be an integral financial and operational part of that project.

Included in the one million acre-feet is irrigation water for the authorized Sacramento Canals unit of the Central Valley Project on which an official report was also made public by Secretary Chapman.

Engineering features of the proposed water resources development are:

Trinity Dam, estimated to cost $79,800,000, on the main stem of the Trinity River nine miles above Lewiston, in northern California, an earthfill structure 410 ft high and 3,300 ft long at the crest. It would impound a reservoir 17 miles long, with a capacity of 1,800,000 acre-ft of water.

Trinity power plant and switchyard, $12,625,000, at the right abutment of the dam, with a generating capacity of 75,000 kw.

Lewiston Diversion Dam and reservoir, $5,660,000, on the main stem of the river nine miles downstream from the main dam. It would be 140 ft high, and back up a lake of 45,000 acre-ft capacity.

Lewiston power plant, $574,000, with 2,000 kw capacity, at the left abutment of the Lewiston Dam.

Tower House Diversion Tunnel, $28,930,000, would be 8.3 miles long, diverting from Lewiston Dam to Tower House power plant on Clear Creek. The tunnel would be 14 ft, 7 in. in diameter and could carry a flow of 1,700 cfs.

Tower House power plant and switchyard, $9,270,000, on Clear Creek, with a capacity of 66,000 kw.

Tower House Diversion Dam and reservoir, $1,214,000, on Clear Creek, serving as afterbay for the Tower House power plant and forebay to divert water into Matheson Tunnel. It would be 48 ft high and 810 ft in length.

Matheson Tunnel, $29,705,000, diverting from the Tower House Diversion Dam. This tunnel, with the same size and capacity as the Tower House tunnel, would be 8.7 miles long.

Matheson power plant and switchyard, $8,600,000, with a capacity of 75,000 kw, located on the western shore of Keswick Reservoir, on the Sacramento River.

Other features of the program would result in a total estimated project cost of $207,334,000. Except for a small sum required for fishery preservation, all of that amount would be repaid to the government from power and water revenues in accordance with the federal reclamation laws.

● **Sacramento** MUD has asked FPC for a preliminary permit for a hydro development in Eldorado County, Calif. The project would be located on the Rubicon River and tributaries.

It would include diversion, regulating and storage reservoirs, with a total capacity of about 246,000 acre-ft and about 16.4 miles of diversion tunnels. The power houses, two on Silver Creek and one on the South Fork of the American River, would have a total installation of 144,000 kw. Also proposed is a 55-mile, 110,000-kv double-circuit transmission line.

● **Pacific Gas and Electric** Co. has been granted permission by the California State Public Utilities Commission to construct an $83 million steam-electric generating plant near Pittsburg, Calif. Plant will have a capacity of 600,000 kw.

Utility Asks for New Feather River Dams

New applications for hydroelectric developments on northern California's Feather River have been filed with the Federal Power Commission by Pacific Gas and Electric Co.

The company last month announced plans for a $114 million development on the North Fork of the river including two diversion dams and four power plants, generating a total of 364,000 kw. Pacific Gas and Electric Co. already has six power plants on the Feather River generating some 387,000 kw.

Two other applications for developments on the Feather are presently before the FPC, one by the State of California for a $1 million multipurpose dam near Oroville, and one by the Oroville-Wyandotte Irrigation District for a $30 million hydro and irrigation project on the South Fork 25 miles east of Oroville. None of the applications conflict.

The Bureau of Reclamation, which also had applied for rights on the river, recently announced through its Sacramento office that it would withdraw its claims if the state went ahead with its Feather River plans.

The new PG and E development would include:

1. Butt Valley power house, served by water from Lake Almanor through an 11,300-ft-long 13-ft-diameter tunnel and a 6,700-ft steel pipe penstock.

2. Caribou 2, using water from the existing Butt Valley reservoir through 9,200 ft of 12-ft-diameter tunnel and 2,300 ft of penstock.

3. Belden, which will receive water stored by a new concrete diversion dam 150 ft high through 33,700 ft of 15½-ft tunnel and 3,800 ft of syphon and penstock.

4. Poe, which will receive water stored by a 60-ft-high diversion dam through 33,700 ft of 19-ft tunnel and two 780-ft penstocks.

Planning future construction of four power houses on the McCloud River, PG and E also has applied to FPC for a preliminary permit for development there. These four plants would develop the river between Shasta reservoir and a proposed storage reservoir on Squaw Valley Creek.

ONE Nichrome

"One World." All over the globe, men have come to acknowledge this unique concept as the most effective basis for solving innumerable problems related to human progress.

"One Nichrome." All over the globe, men have come to acknowledge this unique alloy as the most effective means for solving a host of problems also related to human progress—in the fields of engineering and production.

This being so, we take particular pride in our trademark: NICHROME—granted solely and wholly to us by the United States Patent Office forty-three years ago. Representing a series of superb electrical heating and resistance alloys, developed and produced *only* by Driver-Harris, it symbolizes top quality and utmost dependability to manufacturers everywhere.

**T. M. Registered in United States Patent Office by Driver-Harris Company August, 1908*

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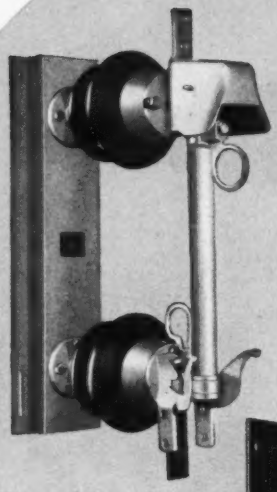
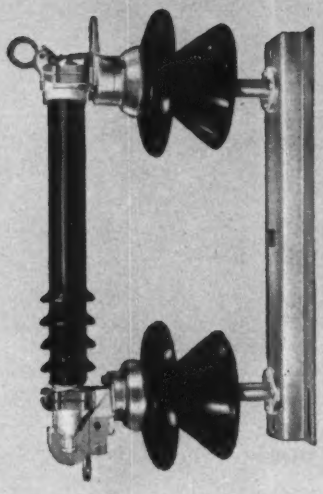
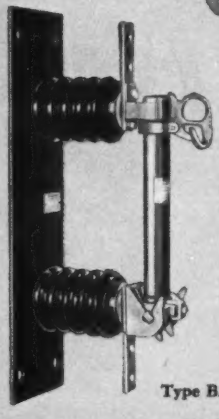


Type DBA (Drop-out) Power Fuse



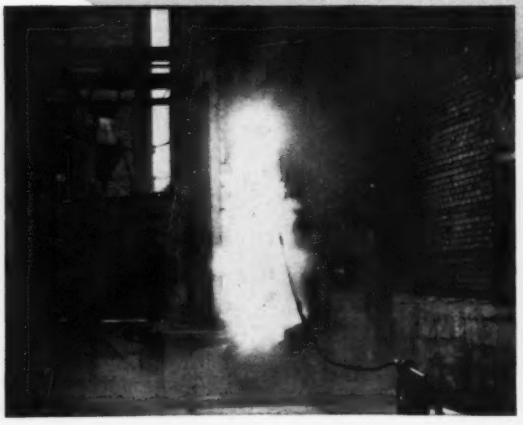
Type BA Power Fuse



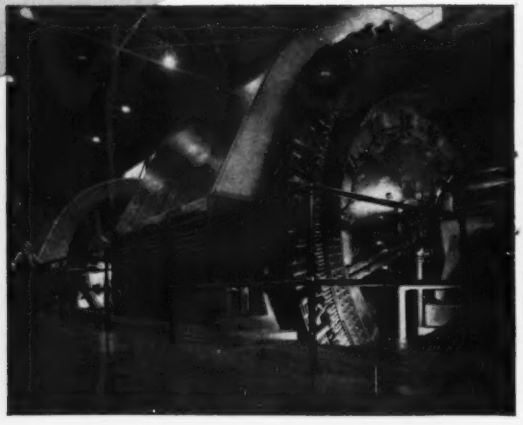
Type BAL (Current-Limiting) Power Fuse

DESIGN TESTED AND VERIFIED in the Westinghouse HIGH POWER LABORATORY

THE SEAL THAT SAFEGUARDS YOUR INVESTMENT



In a typical High Power Laboratory test, a Type DBA Fuse is shown interrupting the equivalent of a 3-phase, 1,000,000-kva fault. An instant after the photo was taken, the drop-out element operated, isolating the circuit.



Source of the laboratory's tremendous power are these two 60,000-kva generators. When paralleled, they are capable of delivering a 3-phase fault of 2,500,000 kva, or a single-phase fault equivalent to 4,000,000 kva.

ONLY *CONTROLLED* LABORATORY TESTING CAN PRODUCE THESE RESULTS:

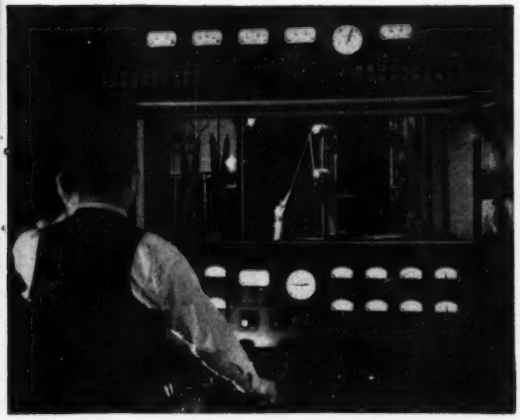
1. Application of Boric Acid Idea to Power Fuses

2. Proved Operation under all Circuit Conditions

In 1931, the Westinghouse High Power Laboratory—already five years old—played a major role in the development of the boric acid fuse. Conducting multiple tests under controlled conditions not available in the field, Westinghouse Laboratory technicians proved conclusively the soundness and superiority of the boric acid interrupting principle. The result is a complete line of low-cost protective devices proved to a degree unattainable by other means of testing. Considering the extent of your investment in fuse-protected equipment, this extra measure of sureness is an invaluable advantage. And it's one you get only when you specify Westinghouse.

Continued High Power Laboratory testing has also widened the application of this economical means of short-circuit protection. From the first Type BA Fuse, low-cost interrupting capacity has advanced with the development of Types DBA (drop-out) and BAL (current-limiting) until now 138,000-volt fuses that interrupt one million kva are available.

FOR COMPLETE INFORMATION on Westinghouse Power Fuses ask for a copy of Booklet B-5469. Contact your Westinghouse representative or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60781



From this control desk, a single operator guides all high power testing facilities. The control room also houses indicating instruments, protective relays, sequencing drums, and oscillographs which simultaneously record as many as eighteen variables.

See "Electrical Proving Ground"

...the dramatic story of the Westinghouse High Power Laboratory in sound and color motion picture. For details, see your Westinghouse Representative, or write: Westinghouse Film Division, Box 868, Pittsburgh 30, Pennsylvania.

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WEST LAFAYETTE, OHIO

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SEATTLE CONSIDERING HIGH DAM ON SKAGIT

An engineering survey for a possible additional high dam on the Skagit River in northwest Washington would be made under a $250,000 appropriation which E. R. Hoffman, superintendent of Seattle City Light, has asked the Seattle City Council to approve.

The proposed dam would be in the vicinity of the Gorge diversion dam, two miles above the Gorge power house. A temporary crib dam, which had been in service some 25 years, was replaced in 1951 by a masonry structure that diverts water through an 11,000-ft tunnel to the power house. The proposed new structure would be about 375 ft high and necessitate construction of a highway between Gorge and Diablo Dams, since it would flood out the railroad along the river which presently provides transportation.

A study of the feasibility of a high dam for the Gorge power project is now advisable since the Ross Dam power house will be completed next year, Hoffman told the council. Construction of the high dam would make it possible to increase capacity of the Gorge power plant from its present 104,000 kw to 152,000 kw.

The survey also would study feasibility of other power sites on the upper Skagit River.

PGE Will Explore Deschutes Site

Under a two-year preliminary permit issued by the Federal Power Commission, Portland General Electric Co. will explore geology and foundation conditions at the site of the proposed Round Butte Dam on the Deschutes River in central Oregon. This preliminary work will be in preparation for formal license applications to the FPC and the Oregon Hydroelectric Commission.

The Round Butte Dam would be upstream from site of the Pelton Project for which PGE recently received a license from FPC, but is subject to a suit in the United States Court of Appeals in which the Oregon fish commission opposes the project.

PGE plans call for a 350-ft-high dam at Route Butte and a reservoir backing up eight to ten miles in the Deschutes, Crooked and Metolius River canyons. It would be at the upper end of the Pelton Dam reservoir. Cost would be about $40 million.

STEEL STRAND
Crapo GALVANIZED PRODUCTS

ALL the strength and durability inherent in steel are combined—with definite economies— in Crapo Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous Crapo Galvanizing Process, provide lasting protection against corrosion.

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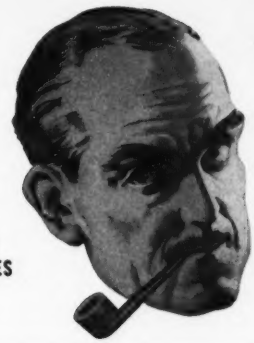

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a transmission line engineer asks—

"is there an insulator that will reduce the effects of air pollutions ?"

Here is the ANSWER:

Yes, there is. It is the PINCO L-1925 "UNIVERSAL" INSULATOR which is specifically designed to reduce to a minimum, the damaging effects of fly ash and other air-borne industrial wastes which tend to decrease insulator efficiency and create a costly operational maintenance problem.

and 5 reasons WHY...

1. Leakage distance of 17" is approximately 50% greater than 10" suspension unit.
2. Outside petticoats shielded above by bell; below by hood.
3. Long, tapered hood is self-cleaning; acts as a splatter-baffle to clean the petticoats.
4. In strings, interior of hood is shielded by unit below—protected against contamination, thus reducing manual cleaning requirements to a minimum.
5. Standard 5¾" spacing permits replacement of conventional 10" suspension units without re-sagging.

Service records over a period of 20 YEARS

of continuous operation prove that thousands of these Pinco units have met their job requirements 100% in areas where excessive insulator contamination is an operational hazard. Certainly such a record of trouble-free performance proves that they're "right" where it counts . . . right on the job!

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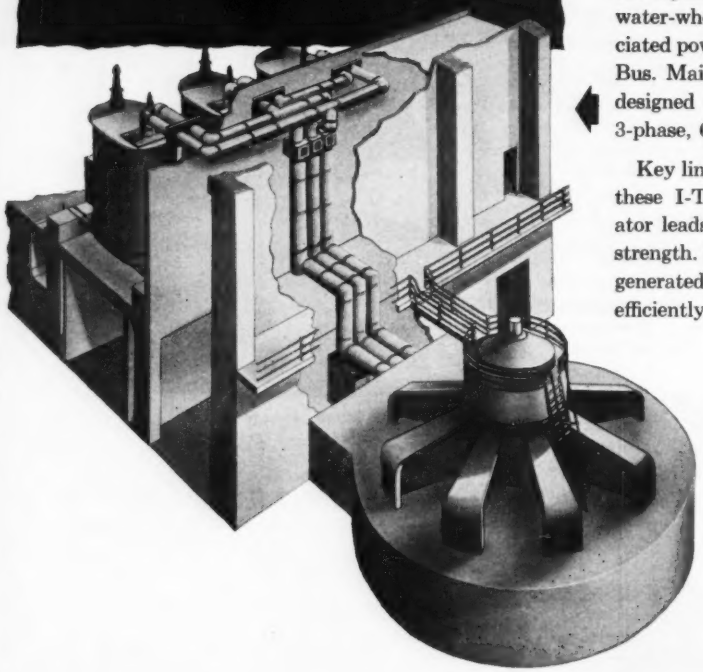
All power generated at Grand Coulee

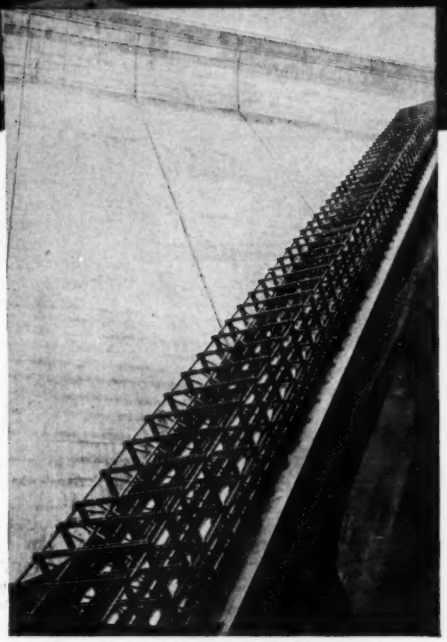
is carried by I-T-E Isolated Phase Bus



EIGHTEEN SETS OF GENERATOR LEADS

All eighteen of Grand Coulee's giant 108,000-kw water-wheel generators are connected to their associated power transformers by I-T-E Isolated Phase Bus. Main buses are rated at 5,000 amperes and designed for an operating voltage of 13.8-kv, 3-phase, 60-cycle—with one conductor per phase.

Key links in this huge power-generation system, these I-T-E air-insulated, metal-enclosed generator leads possess high dielectric and mechanical strength. Bus is built to carry the heavy currents generated by these eighteen power giants, safely—efficiently—dependably.



SIX PUMP BUS RUNS

The Grand Coulee pumping station will ultimately house 12 giant pumping units, each powered by a 65,000-hp, 200-rpm, 13.6-kv, 3-phase, 60-cycle synchronous motor. *Six pumps are now in service. Six others are planned for future installation.*

Power for this pumping service is supplied by three of the main generators, each generator feeding *two* pump motors. The three I-T-E Isolated Phase Bus runs now installed carry power—4300 amperes in each circuit—260 feet up the face of the dam. Six branch buses, rated at 2150 amperes each, connect the pump motors.

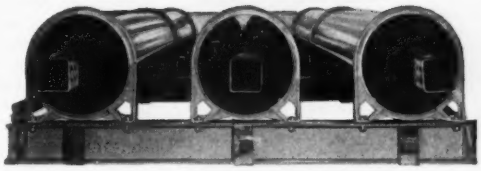
This I-T-E bus connection—comprising *9000* single-phase feet—is the longest structure of its kind in the world.

DESIGNED FOR MAXIMUM SERVICE CONTINUITY

Principal feature of these I-T-E bus runs is unique *isolated phase* construction. Each conductor is encased in an *individual* non-magnetic housing. Each housing is separated from adjacent housings by an insulating air space. *Phase-to-phase short circuits are virtually eliminated!*

MORE THAN 30 CONDUCTOR-MILES IN 277 INSTALLATIONS

I-T-E Isolated Phase Bus has been transmitting power from the world's largest generators since 1936—providing power plants with safe, dependable service.



I-T-E

ISOLATED PHASE BUS

I-T-E CIRCUIT BREAKER CO. · 19th AND HAMILTON STS., PHILA. 30, PA.

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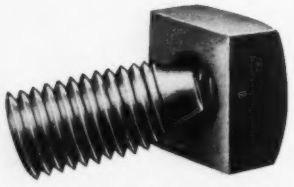
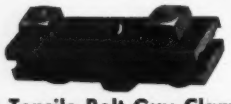


Handipoint Bolts and Rods



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BPA PROGRAM CALLS FOR TEN-YEAR EXPANSION

New generation of 750,000 kw every year for the next 10 years will be needed in the Pacific Northwest to meet existing power deficiencies and provide for load growth, according to Bonneville Power Administration's 1952 advance program.

"On schedule" completion of dams now under construction, additional needed projects in the Columbia and Snake River basins, steam plants and Oregon-Idaho and Oregon-California transmission interconnections are listed in the report as key factors in meeting regional power needs to 1960-61.

To support this program, BPA estimates an annual federal investment of some $250 to $300 million will be needed.

BPA Administrator Paul J. Raver said that the Pacific Northwest faces an estimated regional average deficit during this year's drawdown period of more than 600,000 kw, including interruptible sales.

"The full output of McNary Dam would barely take care of our present deficit," Raver said. "And other federal dams now under construction will be adequate only to take care of load growth. Only through new projects will we be able to serve any important new industrial or defense loads, especially in the electroprocess field."

Noting that the current defense generation schedule "U" federal project development program recommended by BPA, the Bureau of Reclamation and the Corps of Engineers calls for a Columbia River power system with a prime capability of nearly seven million kw by 1960-61, or about five times present capacity, and that nonfederal power installations scheduled through 1955-56 would add some 722,000 kw of prime power, the advance report said that, even if these schedules are followed, power will remain critically short for at least the next two to five years. And, the report adds, the Columbia River power system would not be able to provide all requirements for new industry at any time during the next 10 years.

Two proposed dams, Ice Harbor and Hells Canyon, are listed as the most urgently needed projects, aside from those under construction.

"If Ice Harbor Dam is not constructed promptly," the report says, "it will be necessary for the government to spend several million dollars for otherwise unnecessary transmission and generation facilities to improve continuity of power supply to the Atomic Energy Commission and the Hanford Engineering Works, where the nation's plutonium is produced."

Hells Canyon, the report adds, would unlock the hydro potential of the Snake River basin, where nearly one-third of the potential power of the Columbia basin lies.

The report lists the major engineering task confronting BPA in the next 10 years as the designing and construction of an expanded transmission grid capable of carrying a total of almost 9.5 million kw from 31 large and small generating plants scheduled to be in operation in 1961 to load centers in a Pacific Northwest area extending eastward to the Continental Divide and southward to the southern borders of Oregon and Idaho.

A power rate increase at the next adjustment date, December 1954, is indicated in the report, due to increased material prices and construction costs.

● **Last major award** for construction of power features of the Colorado-Big Thompson Project was made recently by USBR when it awarded to the Eagle Erection Co. of Shoshoni, Wyo., contract for completion of the Pole Hill power plant and Flatiron power and pumping plant. The bid was $1,097,324.

● **Westinghouse** Electric Corp. has received a $9 million order from Kaiser Engineers Inc. of Oakland, Calif., for electrical equipment to be installed at the Chalmette aluminum reduction plant of Kaiser Aluminum and Chemical Corp. The equipment, scheduled for delivery by December, is part of a project to double capacity of the plant.

● **S. Morgan Smith Co.** of York, Pa., was apparent low bidder on two 9,400-hp hydraulic turbines for Nimbus power plant of the USBR's American River, Calif., development. Bid was $488,575, with specified delivery time of 780 days for the first turbine and 840 for the second.

● **Christening ceremonies** were held in mid-May for Kenney Dam, key structure of Aluminum Company of Canada's British Columbia hydro refinery project. The 325-ft-high, 1,500-ft-long dam was named after Lands and Forests Minister Hon. E. T. Kenney, credited with selling Alcan on the $500 million project.

● **Snohomish County PUD** has purchased a central business location at Everett, Wash., upon which to build a proposed office building when materials become available and when the lease expires on its present quarters.

We Increased Revenue ...Eliminated Complaints due to Low Voltage

Electric Power Executive Reports:

"We have regulated our entire system with Allis-Chalmers AFR (power) regulators and JFR (distribution) regulators and we have noticed a substantial increase in revenue.

"Also, we have completely eliminated complaints due to low voltage and this alone is worth the small cost of the regulators."

Application-proved advantages of Allis-Chalmers 5/8% step voltage regulators assure you of properly regulated voltage. The narrow ± 1 volt band provides accuracy. The voltage integrator permits the regulator to meet specific load conditions. 20% range of regulation makes it possible to boost capacity, or to extend feeder length at minimum expense.

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Twenty years of design and development give you proved advantages in durability. Take the tap-changing mechanism for example. It has stood up under life tests of 5,000,000 operations — equivalent to 100 years of normal service.

Get the complete story. Call your nearest A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

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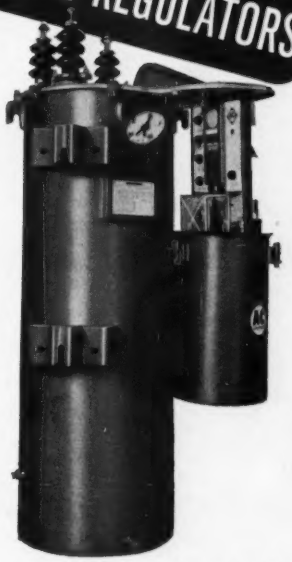
5/8% STEP VOLTAGE REGULATORS



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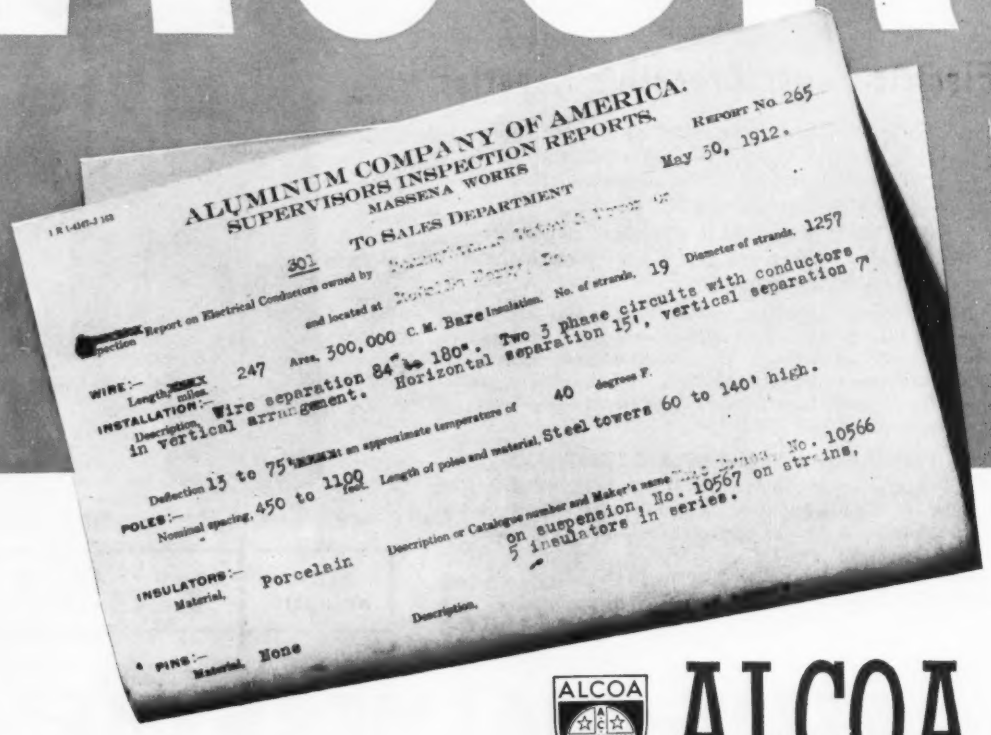

ALUMINUM COMPANY OF AMERICA.
SUPERVISORS INSPECTION REPORTS.
MASSENA WORKS
REPORT No. 265
TO SALES DEPARTMENT
May 30, 1912.
301
Report on Electrical Conductors owned by
and located at
WIRE:— Length, miles. 247 Area, 300,000 C.M. Bare Insulation. No. of strands. 19 Diameter of strands. 1257
INSTALLATION:— Description. Wire separation 84" to 180". Two 3 phase circuits with conductors in vertical arrangement. Horizontal separation 15', vertical separation 7'
Deflection 15 to 75' an approximate temperature of 40 degrees F.
POLES:— Nominal spacing, 450 to 1100 feet. Length of poles and material. Steel towers 60 to 140' high.
INSULATORS:— Material, Porcelain Description or Catalogue number and Maker's name No. 10566 on suspension, No. 10567 on strains, 5 insulators in series.
PINS:— Material. None Description.

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and Alcoa Experience

Shown here is an Alcoa field service report dated May 30, 1912. It's one of several made on a line that's still in service. In the forty years since the report was written, we've been adding constantly to our firsthand knowledge and on-the-job experience by cooperating with our customers in the field.

Alcoa entered the aluminum conductor business over 55 years ago. We've been in it...leading the field...ever since. Those years of high line experience on thousands of successful jobs, the reports of Alcoa experts who have helped string lines throughout the country, have been incorporated into Alcoa's manufacturing techniques.

That's why you get the highest quality wire and cable, aluminum or ACSR, from Alcoa. Cable with uniformly correct stranding . . . a galvanized steel core that meets ASTM specs. Quality features built into the product by careful Alcoa workmanship, checked by rigid Alcoa inspection, backed by half a century of Alcoa experience.

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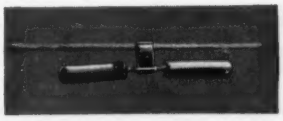
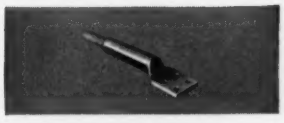
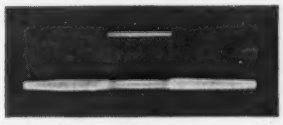
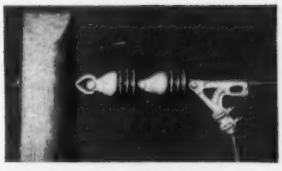
ALCOA ACCESSORIES

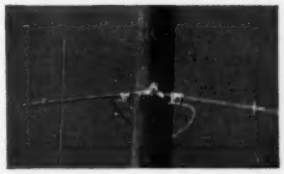
Alcoa offers a complete line of job-proved accessories for aluminum cable and ACSR.











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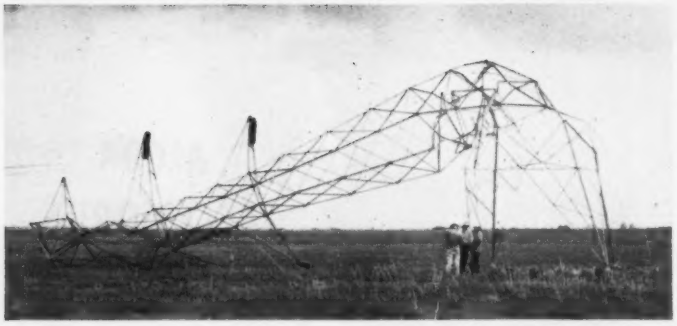
FIRST IN ALUMINUM FIRST IN A·C·S·R



One of 13 transmission towers leveled by a 100-mile wind that hit northern Utah on May 16. The 130-kv line is tie for UP&L's Bear River system and the Northwest Power Pool. A wood-pole line was in service in eight hours; repair cost was $30,000

Results Announced in NLRB Elections

The AFL won over the CIO again in an NLRB run-off election to determine union representation for about 3,000 Pacific Gas and Electric Co. clerical workers.

Clerical employees gave 1,372 to AFL International Brotherhood of Electrical Workers and 436 to the CIO Utility Workers. In the first election the results were 994 for the AFL, 716 for the CIO, and 364 for no union—with the AFL receiving a plurality but not a majority of the votes cast.

Merritt Snyder, IBEW international representative, said that the victory will give the AFL jurisdiction over 14,575 of some 16,000 PG and E employees eligible for membership.

The 956 professional and technical employees of Pacific Gas and Electric Co. elected as their bargaining representative the San Francisco Area Group of the Professional Employees, an affiliate of the National Professional Association of Engineers, Architects and Scientists in a special NLRB election on May 13. The vote tallied: The San Francisco Area group: 390; AFL's International Brotherhood of Electrical Workers Local 1245, 205; CIO Utility Workers Union, 9; no union, 142.

● **Whatcom** County PUD of Bellingham, Wash., will not join the PUD plan to purchase the Puget Sound Power & Light Co. until it obtains clarification on a number of points, according to Conrad Barker, Whatcom PUD chairman. Whatcom wants to know the exact nature of the contract under which six other PUDs propose to purchase the company and the manner in which the power pool would be operated by the combined districts, Barker said. Under proposals so far presented, the PUD commissioners administering the acquired properties would be no more than a "dummy" board responding to strings manipulated elsewhere, Barker fears.

Cost Estimate Ordered On Controversial Line

Two professors of electrical engineering have been employed by a subcommittee of the California Legislature to make an independent cost estimate on the controversial transmission lines to be built by Los Angeles Department of Water & Power in San Fernando Valley.

The department stirred up strong opposition when it issued condemnation notices to property owners along the route of what it intends to be an overhead line. Department engineers say it would cost $29 million to install underground wires as against $11 million for overhead.

Assemblyman Patrick McGee, chairman of the subcommittee on public utilities and corporations, which has been investigating the controversy, has expressed "no confidence" in department estimates.

The two professors are Dr. Royal W. Sorenson and Dr. Gilbert D. McCann, both of California Institute of Technology.

● **Grays Harbor PUD** of Montesano, Wash., has authorized the spending of $104,811 to transfer and relay the Bonneville power supply between Montesano, Elma and McCleary. The project includes 14,000 ft of 55-kv line between Elma and East Elma and three 69-kv oil circuit breakers for the Elma substation.

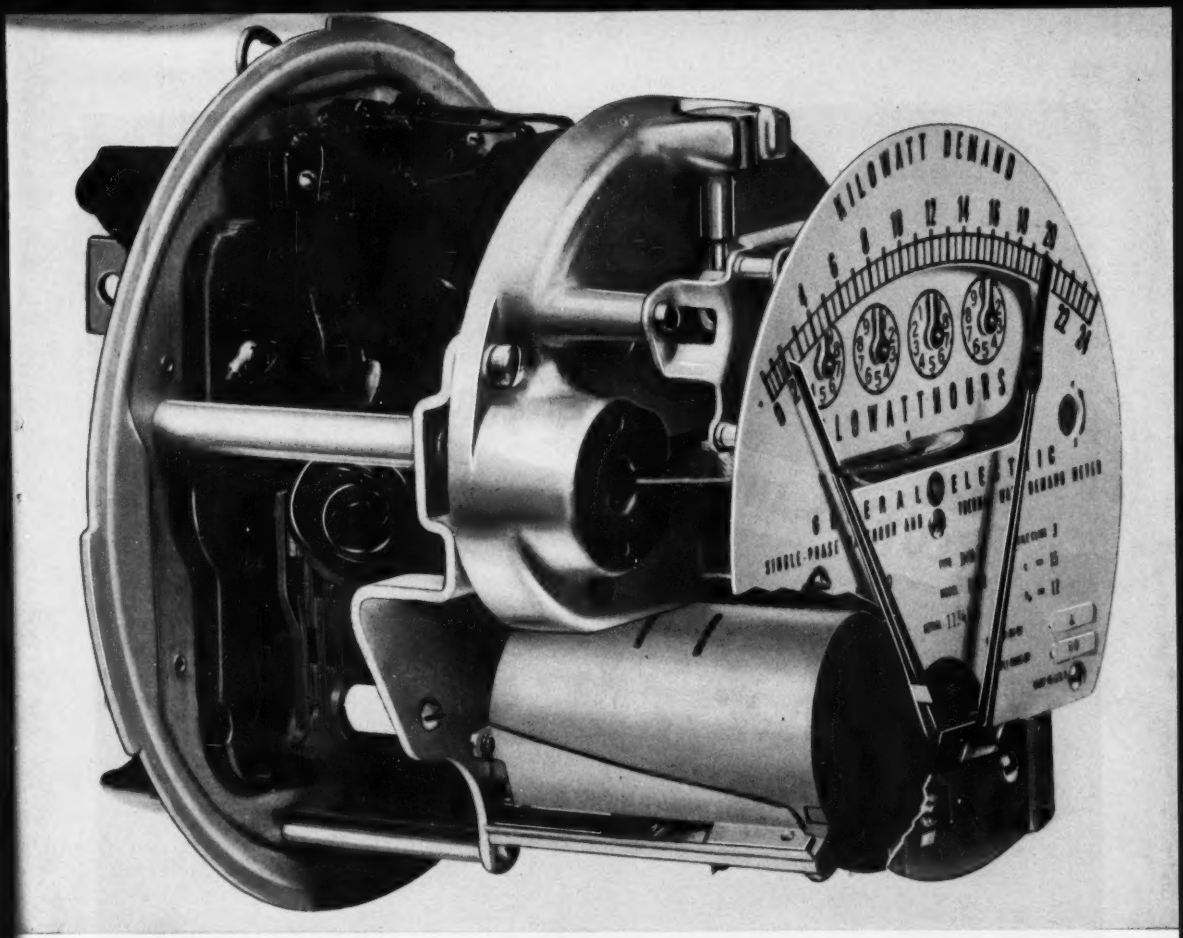
EXPERTS MAKE STATEMENT ON FLOOD SITUATION

Thirty-five water experts of the Corps of Engineers, Bureau of Reclamation, State of California and private water and power agencies have issued to Californians a statement that no disastrous floods will result from the spring Sierra Nevada snow runoff if: (1) normal temperatures prevail; (2) abnormally heavy rain does not occur. The report, however, does stress the danger to some areas inadequately protected. Army officials emphasized that farmers in the San Joaquin-Sacramento River delta should not be lulled into a false sense of security. The farmers have been busy strengthening and building up levees surrounding their property. The engineers called upon them to continue to do so and emphasized the danger period will continue through June. The danger in the delta, the engineers say, will result from a combination of heavy snow melt runoff and high tides from the ocean.

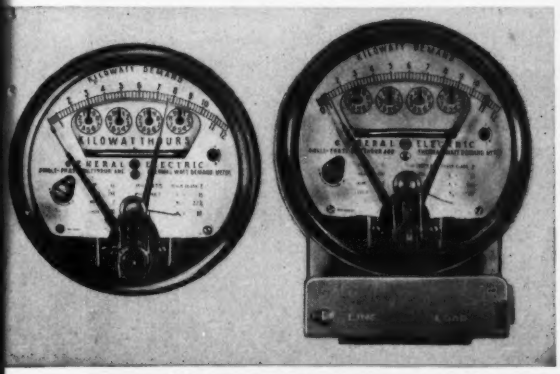
● **Shasta Lake** behind Shasta Dam in California has filled to its 4,500,000 acre-ft capacity for the first time since the gigantic structure went into operation in 1943. Water poured over the top of the spillway drum gates May 14 as the result of one of the greatest winter snowfalls in California history. To take care of the spring runoff and prevent floods along the Sacramento River below Shasta Dam, more than 1,000,000 acre-ft of storage space was held available in the reservoir.

● **USBR** has awarded two contracts for electrical work on the American River division of the California Central Valleys Project. The Schwager-Wood Corp. of Portland was awarded a $47,068 contract for furnishing nine 230,000-v disconnecting switches for the Folsom-East Side line interconnection at Elverta, near Sacramento, Calif. On the same project the Brown Boveri Corp. of New York was awarded a contract for three circuit breakers on a bid of $155,260.

● **A nine-year** engineering research program to discover the best means of getting fish over high dams in the Pacific Northwest has been announced by Col. E. C. Itschner, division engineer for the U. S. Army Engineers, with headquarters in Portland. Col. Itschner said the Fish and Wildlife Service in Washington, Oregon and Idaho state fish and game authorities will cooperate in the program.



Direct-heat Unit of Watthour Thermal Demand Meters Helps Assure Lower Maintenance Costs



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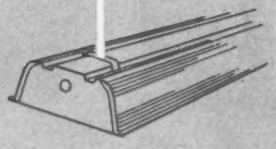
Curtis "Tong Hangers"* facilitate and cut installation cost as they allow flexibility in placement of hangers and permit by-passing of building construction obstacles such as beams, sprinkler heads, etc.

*Pat. applied for.



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WESTERN COMPANIES WIN ADVERTISING AWARDS

Nine Western companies were winners in the Public Utilities Advertising Assn. 1952 Better Copy Contest. Utilities were grouped as follows in the national contest: A, with 400,000 or more meters; B, more than 150,000 but less than 400,000; C, less than 150,000.

Hawaiian Electric won two first awards and B. C. Electric and Public Service of Colorado each took one first. Western winners in all groups:

British Columbia Electric Co., group B—Single newspaper ad promoting use of electricity, third; single booklet to customers, first.

Central Arizona Light & Power Co., group C—Complete programs, third; special employee booklets, etc., third; employee newspaper, second.

Hawaiian Electric Co., group C—Complete programs, first; series of three to five newspaper ads, first; single newspaper ad on any subject, third; single newspaper ad promoting use of electricity, second.

Pacific Gas and Electric Co., group A—Car and bus cards and truck posters, second; outdoor advertising, second; motion picture, tied for third (all competed as one group in this classification).

Public Service Co. of Colorado, group C—Series of bill enclosures, postcard billing cards, etc., first.

Puget Sound Power & Light Co., group A—Series of three to five newspaper ads, third; annual reports, third.

San Diego Gas & Electric Co., group B—Annual reports, third.

Utah Power & Light Co., group B—Printed material used in dealer promotion, second.

Washington Water Power Co., group C—Employee magazines, third; special booklets, etc., first.

● **Sacramento Municipal Utility District** won top honors in the annual report contest of the American Public Power Assn. Publicly owned utilities all over the country competed.

● **A pilot** who survived a power line crash is asking $31,500 damages from Pacific Gas and Electric Co. and privately owned Bay Airport in Marin County, Calif. The pilot, Alfred L. LaCom of Glendale, Calif., crashed into two 60,000-v transmission lines a year ago and his plane hit the ground in a marsh. He claims there were no lights at the field and that the power poles should have been painted orange and white.

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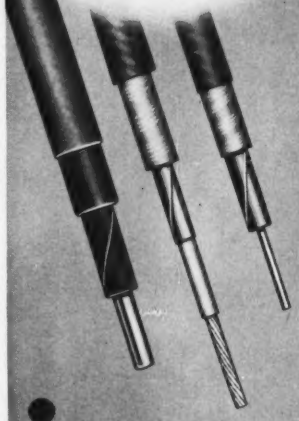

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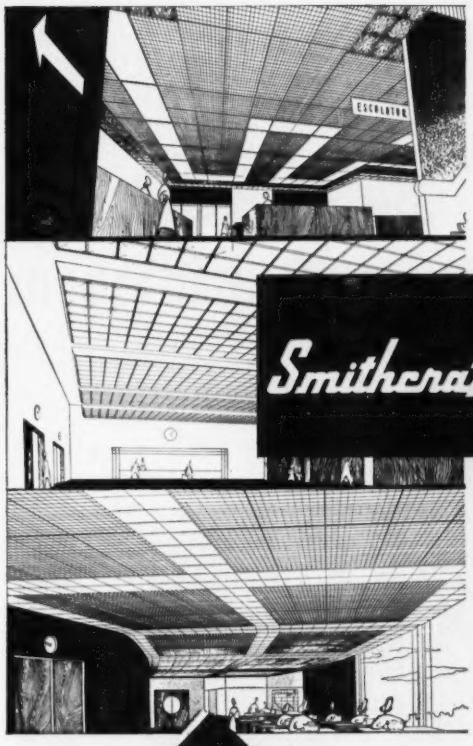

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NOW . . . advanced design fulfills all the possibilities and benefits promised by overall lighting! Smithcraft Area Illumination is a complete fluorescent lighting system free from all the limitations and mechanical difficulties of previous attempts, yet it is not "custom built" to each installation. Skillfully engineered with unbelievable simplicity, Smithcraft Area Illumination when installed becomes a lighting "fixture" of limitless dimensions, shapes and patterns with unrestricted selection of shielding media and varied intensities within the system. For those who plan, recommend and install, here is an important new tool and business-producer; for the user, Smithcraft Area Illumination opens up exciting new possibilities for effect combined with illumination of unequalled quality.

architects

To the architect, **Smithcraft Area Illumination** presents a new opportunity for freedom of expression in the integrating of lighting interiors within interior design. Here is freedom of choice with no restrictions as to **size, pattern, intensity, shielding,** and **periphery.**

engineers

Engineers can now specify **and get** any required level of intensity. Or **different** intensities for different sections of an installation may be recommended to permit optimum usage of store or office areas. Alternating light, rows of lighting, or banks of lighting are possible because of flexibility of switching and a specially designed wiring system.

contractors

Ease and economy of installation are truly amazing! **Smithcraft Area Illumination** is actually installed in far less time than any combination of ceiling and illumination currently available. No careful dimensioning is required and no special tools, rules, or gadgets. From the time the hangers are in position on the ceiling to the finished installation, only a water level and small screwdriver are required.

owners

For those who own buildings and businesses of many kinds, **Smithcraft Area Illumination** is a **profitable** and practical investment. Versatile and adaptable, here is highest quality illumination combined with appearance and effect that **sells** and **produces.** Its ease of maintenance and adaptability to future plans and developments are factors that interest any businessman. Yet, its initial cost is comparable to that of a suspended ceiling and troffer system.

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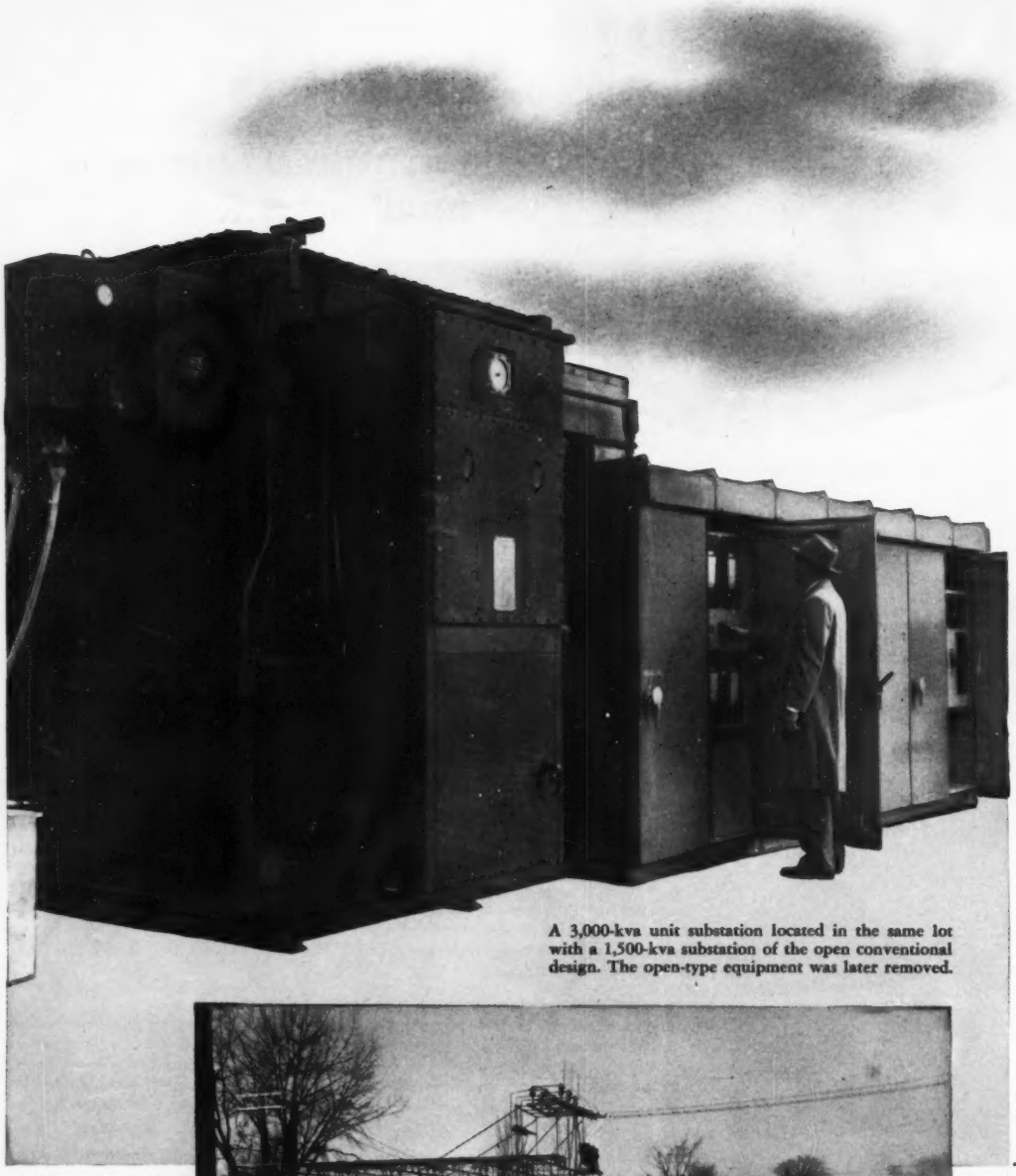


A 3,000-kva unit substation located in the same lot with a 1,500-kva substation of the open conventional design. The open-type equipment was later removed.

Midwest utility modernizes system, solves load problem

WITH WESTINGHOUSE UNIT SUBSTATIONS

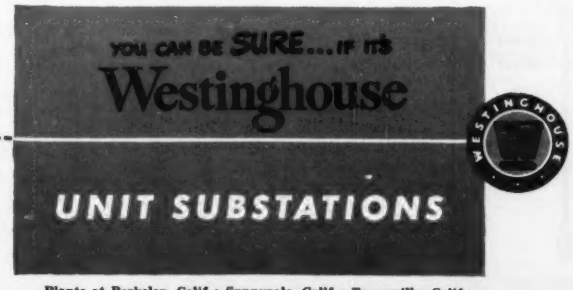
The experience of Iowa-Illinois Gas & Electric Company with unit-type substations will interest progressive system planners. It suggests a way to attain this important objective: *a simplified flexible system providing long-range operating economies.*

"Load growth in our area made it imperative for us to modernize our distribution system. After considerable study it was decided to use factory-built, unit-type substations.

"Westinghouse Unit Substations of co-ordinated unit design met our requirements . . . maintenance has been very slight . . . location of the substations close to the load center keeps losses to a low value and provides for better regulation. Future expansion is simply and economically handled by adding unit substations in areas of maximum load growth —or by moving a substation in its entirety, if load shifts, thereby salvaging the bulk of the investment."

Iowa-Illinois Gas & Electric enjoys these benefits because Westinghouse Unit Substations are specifically designed to meet today's power distribution problems. Unitized construction simplifies expansion to accommodate increased load requirements. Individual feeder regulation can often be eliminated and Westinghouse Unit Substations offer these same advantages to you.

For complete information, get your copy of Booklet B-4061. Ask your Westinghouse Representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60779



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FINANCIAL ANALYSTS HEAR UTILITY MEN

That utility profits should increase, since costs probably will level off unless there is war was the opinion of Carl C. Brown of Laurence M. Marks & Co., New York, at the Fifth Annual convention of the National Federation of Financial Analysts Societies in San Francisco last month. Brown believes also that income taxes will remain at present levels.

He emphasized, however, the need for a realistic regulatory climate to keep electrical utility stocks attractive to investors. Many regulatory commissions, he indicated, are biased in favor of the rate payer, giving little heed to the interests of the stockholder. Further, they often allow such a time lag from application to decision as to make the allowed increase inadequate.

Power men told the analysts that, while there had been some rough battles between federal and private power, they believed the two were learning to live together and that Western private power was here to stay and grow and make money for its stockholders.

James B. Black, PG and E president, told a forum meeting that he certainly does not underrate federal projects in California as a potential threat, but saw no occasion under present Congressional policy "to have misgivings as to our ability to live with them."

Commenting that the relative magnitude of the federal power projects in California tended to be overemphasized, he pointed out that PG and E in 1950 and 1951 added 950,000 kw of new capacity, one and one-half times the rated capacity of present and proposed Central Valley Project power plants. By the end of 1954, he said, PG and E expects to have a total capacity of 4,150,000 kw, which will approximate the combined installations constructed and authorized of all the big government projects on the Pacific Coast.

Speaking for the Pacific Northwest, Thomas W. Delzell, chairman of the board, Portland General Electric Co., challenged the term "public power empire," as applied to his area as a "completely false label." Western Washington is the only strongly public power area, he declared.

No new PUD has been created in the Northwest in the last 12 years, he said. In Oregon in the past 15 years, there have been 55 elections to form PUDs, of which 43 failed, he added. Of the 12 nominally organized, only four proceeded with the second elections necessary for actual operation. In the meantime, two went out of business, so the net gain was two districts, he said. Private utilities serve 90% of all electrical customers in Oregon, PUDs serve 2%, with REAs and municipal operations serving the remainder, he pointed out.

He explained that the Northwest's peculiar geography made federal reclamation help welcome and necessary and that hydroelectric generation at flood control and irrigation projects to help pay for the benefits was sound practice.

Five recent developments contributed to the strengthening position of private power in the Northwest, he declared. They are:

1. Five utilities have obtained five-year contracts with Bonneville.
2. DEPA last September set up orderly and fair procedures for load curtailment in case of power shortages, easing the previous problems resulting from Bonneville's preference contracts.
3. Both Oregon and Washington PUCs have agreed to allow surcharges for excess costs necessitated by use of steam generation in short power periods.
4. Pacific Power & Light and Washington Water Power are no longer under holding company control.
5. Private utilities are indicating willingness to install new capacity.

● **A $17.5 million appropriation** to complete construction of the Ross power plant on the Skagit River has been approved by the utilities and finance committees of the Seattle City Council. It represents the balance remaining from a $41 million City Light construction fund set up in 1949 for the project. Plans call for completion of the power house and operation of the first 90,000-kw generator by December of this year, with the other two 90,000-kw generators to go on the line early in 1953.

● **Colorado Central Power Co.** has received permission from the state PUC to issue $700,000 worth of first mortgage debentures to finance its expansion program. The securities, payable Nov. 11, 1963, carry 4½% interest and will be purchased by the Northwestern Mutual Life Insurance Co.

● **City of Tacoma,** Wash., has received NPA approval for construction of a $2,644,000 operating headquarters and warehouse building for its City Light department, according to C. A. Erdahl, public utilities commissioner. Construction is scheduled to begin this summer.

DUTCH BRAND adds "DB" Wire Connectors to supplement line of electrical tapes!

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In the DUTCH BRAND trio you have quality dependable tapes that have been on the market for years. Order them by trade name . . . DUTCH BRAND.

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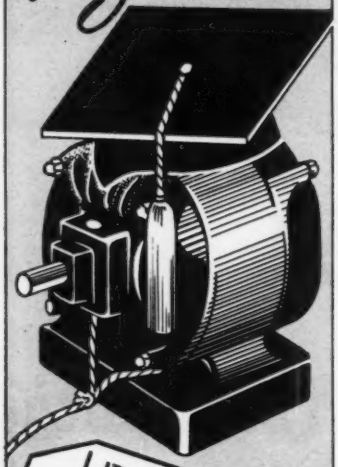

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POWER SERVICE DEMAND DECLARED ILLEGAL

The California-Pacific Utilities Co. and Colorado River Commission, temporarily enjoined April 28 from refusing power service to members of 12 unions employed by the commission or its lessees in Henderson, Nev., won their point May 13, when Judge Frank McNamee dissolved the order.

The temporary injunction was issued by Judge McNamee in District Court of Nevada in Las Vegas on petition of the unions and five employees of the Stauffer Chemical Co.

Basis of the suit was an agreement reached between the river commission and the unions on September 1, 1948, which stipulated there would be no raise in rents at Henderson townsite. Until the recent sale of the electrical system by the commission to the California-Pacific Utilities Co., power for all purposes, including heat, was included in the rent. The unions contended that requiring residents to pay for their power and light is equal to a rent increase of $15 to $25 a month.

On April 23 the utility asked occupants of the housing project to apply for electric service. When the five complaining residents refused to sign the applications, service to their homes was discontinued and the injunction action followed.

Judge McNamee held that the contract is not binding against the lessees and suggested that the unions renegotiate the contract.

● **A new Bonneville** Power Administration microwave station on Rattlesnake Mountain near North Bend, Wash., will be served by the Mutual Power & Light Assn. of nearby Tanner as the result of an $80,000 loan granted the association by the REA. The loan will build a 4-mile line to the station, the first step in carrying the microwave system into eastern Washington, and also 13 miles of distribution line in the vicinity.

● **USBR contract** for construction of the Palisades Dam and power plant, on the south fork of the Snake River about 50 miles from Idaho Falls, was awarded to the J. A. Jones Construction Co. of Seattle and the Charles H. Tompkins Co. of Washington, D. C., on a joint-venture low bid of $29,180,346.

● **Approximately $700,000** will be spent in the installation of street lighting in Vancouver, B. C., this year. Most of the money will be used on new transit routes on Cambie, Richards, Broadway, Oak and Arbutus St.

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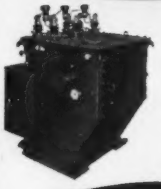

20.8 Kva, 2400 Volts through 750 Kva, 13,800 Volts

UNIT SUBSTATIONS

1000 Kva through 3000 Kva, 12,000 Volts through 34,500 Volts Primary

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LINE CONSTRUCTION BODY (500)
Medium and heavy duty work. Vertical compartments are optional . . . can be equipped to fit individual needs.

FOR LONG LIFE AND TROUBLE FREE SERVICE

All *Powers-American* bodies have *earned* the reputation of "workhorse" of the utility industry by years of faithful performance. No matter how tough the job or the operating conditions, they pull more than their share of the load by stepping up crew efficiency and lowering operating costs. Whatever your utility body needs, *Powers-American* is your *1* source for *all types* of utility bodies and equipment. Write today for more information. Put a *Powers-American* "workhorse" on your job and watch the team pull ahead!

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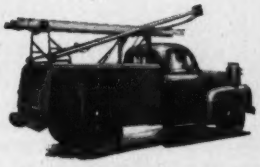
Models available in working heights of 23' 6", 26' 6", 30' 6", and 32' 6" for all styles of bodies.



LIGHT DUTY MAINTENANCE BODY (350)
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LINE CONSTRUCTION BODY (600)
Completely equipped to carry all tools and materials needed for line work. Can be furnished with winch and derrick, compressor, digger, or any special equipment required . . . for use in any phase of the utility industry. Available in 9' to 14' lengths, with or without built-in crew compartment.

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NEWS ABOUT PEOPLE

● **Paul A. Blanchard** has been appointed to the new post of steam production engineer for Utah Power & Light Co. **John S. Anderson** succeeds him as mechanical engineer dealing specifically with steam engineering problems. **J. H. Hutchinson** has been made assistant superintendent of the Hale plant, succeeding Anderson.

● **Whitney H. Owen,** former Bureau of Reclamation engineer, has been named electrical engineer for the Municipal Electric Power System of Provo, Utah. In the newly created post he will head the electric power department in a staff capacity and serve as field consultant for the Provo Utilities Board.

● **Eugene I. Pease,** head of the engineering division of the Seattle District, Corps of Engineers, for the past five years, has retired after more than 41 years of service. He worked summers for the corps while studying electrical engineering at the University of Washington, has been with them full time since his graduation in 1912.

● **E. A. Woodhead,** Idaho Power Co.'s veteran power plant builder and oldest employee in years of service, became chief consulting engineer of the company recently. Formerly superintendent of power plants, he will be available for special assignments and for engineering consultation, particularly in regard to long-range planning. Woodhead received the company's diamond 45-year service button last August. He started work in August 1906 for the Great Shoshone and Twin Falls Water Co., one of the predecessor companies of Idaho Power. As construction and distribution foreman he built most of the original transmission and distribution lines in the Twin Falls area. His responsibilities in power plant operation and maintenance will be assumed by **H. R. Moore,** who is also in charge of distribution of power. **T. R. Heikes,** who has been assisting Woodhead in the operation of plants, becomes operating superintendent of power plants.

Photographed in Hoover power plant during installation of unit A-4 in the Arizona wing: front—Ed Helgren, construction engineer, Boulder Canyon project; L. R. Douglas, director of power, BCP; W. F. Wolters, generator erector, Allis-Chalmers Co.; Richard Searles, undersecretary, Department of Interior; E. A. Moritz, director, Region 3, USBR; Michael Straus, USBR commissioner; back—D. O. Towne, electrical engineer, BCP; Frank Starck, electrical engineer, Allis-Chalmers; C. M. Elliott, Elliott & Gist; R. S. Dominick, engineer, Allis-Chalmers; W. Ross, superintendent, Howard P. Foley Co.

● **Robert Thallon** has been appointed assistant sales manager for Fluorescent Fixtures of California, replacing Moody Jensen. He joined the company in 1951; was previously with Pacific Gas and Electric Co.

● **Walter Brenton** has been named general superintendent of Portland General Electric Co., succeeding **J. C. Henkle,** who retired.

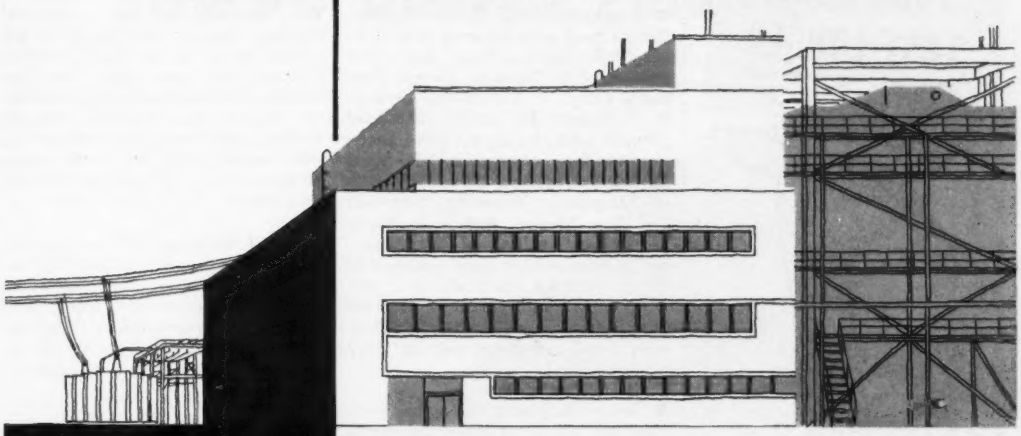
● **Lowell V. Chase,** in charge of sales promotion for the Graybar Electric Co. at Seattle, for the past two years, has been promoted to the position of appliance sales manager at Portland. Before going to Seattle, Chase was appliance sales manager at Eugene, Ore.

● **Walden Heating** Co., 2557 15th St., Denver, will handle the 1952 line of Mitchell window-type room air conditioners.

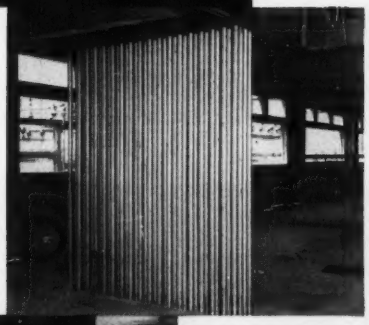
Members of the California Inter-Utilities committee met recently at Long Beach. Carter Blankenburg, extreme left, was the host

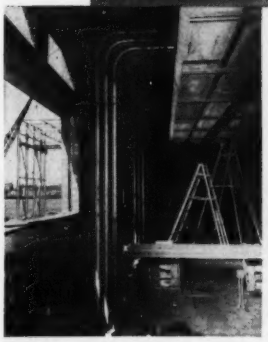
In Florida
at Jacksonville's New Power Plant

THEY'RE EXPERTS IN HOT CIRCUITS



...THEY APPROVED SPANG® CENTRAL CONDUIT





Two-inch Spang Conduit on circuits for controlling and metering 69,000 volt switchyard.

Control and metering of 13,200 volt switchyard and transformer protection for one 15,000 KVA and two 37,500 KVA transformers is through two-inch Spang Conduit.

The men who designed the new South Side Generating Station at Jacksonville, Florida, are specialists in equipment for handling power . . . high voltage and low voltage. They designed for peak operating dependability around the clock, day after day.

Which makes particularly significant their approval of Spang Central Conduit . . . for all control systems and many other needs in this ultra-new power station. When power engineers approve an electrical product, *you can be sure it's good.*

That's why we urge you to standardize on Spang whenever you want the utmost in dependability. It's a quality-controlled conduit . . . made from carefully selected steel, formed under exact heat conditions, inspected constantly—manufactured to give exactly the right bending, cutting, and threading characteristics. All features that will cut your installation time and costs.

Be sure to specify Spang "Cenlaco", "Central Black", "Central White", "Central EMT" for a guarantee of year after year of trouble-free service. You'll find it will pay!

The Builders were:
Engineers & Architects: Reynolds, Smith & Hills, Jacksonville, Florida
General Contractor: George D. Auchter Company, Jacksonville, Florida
Electrical Contractor: Cleveland Electrical Company, Jacksonville & Atlanta

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Division of The National Supply Company
GENERAL SALES OFFICE:
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We Can Make
YOUR POLES
LAST LONGER
AND LONGER...
AND LONGER...
AND LONGER...
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OSMOSE
INSPECTION AND
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This program, performed by our highly skilled crews, can save your system hundreds of thousands of dollars in REPLACEMENT COSTS by
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NOTES ON THE TRADE

● **Purchase** of the Bacon Agency, Denver, and establishment of a Denver district office on June 1 have been announced by National Electric Products Corp. of Pittsburgh, through **R. C. Bennett Jr.**, vice-president and general sales manager. The Bacon Agency has represented National Electric Products for 29 years in eastern Montana, Wyoming, Colorado and New Mexico. **Arthur E. Bacon Jr.**, former manager of the agency, has been appointed sales manager of the new district which will be a part of the Western region, with headquarters in San Francisco. Denver offices and warehouse are at 3327 Brighton Blvd.

● **Robert A. Young** & Co. has been appointed sales and service representative in southern California and in Arizona for the Electric Products Co. of Cleveland. Offices are in Glendale, Calif.

● **Donwill Co.** of Portland will distribute the Industrial Monkey on a nation-wide basis through the Mobilift Fork Lift Truck sales and service branches.

Electric Supplies Distributing Co. of San Diego, which recently acquired the Santa Ana branch of the L. B. Marsh Co., has now acquired the two Long Beach branches, one of electrical housewares and the other a wiring supply house. Management personnel has been retained.

● **Moe Light Inc.** of Fort Atkinson, Wis., manufacturer of residential lighting fixtures, has acquired the capital stock of the Star Lighting Fixture Co. of Los Angeles. The Star business was founded by the late Walter Wetzel. His son-in-law, **Claude Rollick**, who has been president of the company since 1951, will remain as general manager of the Los Angeles plant.

● **Leo J. Meyberg Co.** has been appointed southern California distributor for Hoover products, including special cleaners, electric irons, hand cleaners and floor polishers. The franchise does not include electric cleaners, sold through dealers with Hoover salesmen.

● A new science show, *Energy in Action,* has been produced by Westinghouse. It is designed to show the progression of science toward the atomic age and the ever increasing utilization of energy; runs 90 minutes. A two-hour version includes a color movie, *Energy Is Our Business.*

● **Conrac Inc.**, manufacturer of TV receiving sets, TV utility monitors and other electronic equipment, has opened a new sales and display room at 7264 Melrose Ave., Hollywood 46, Calif.

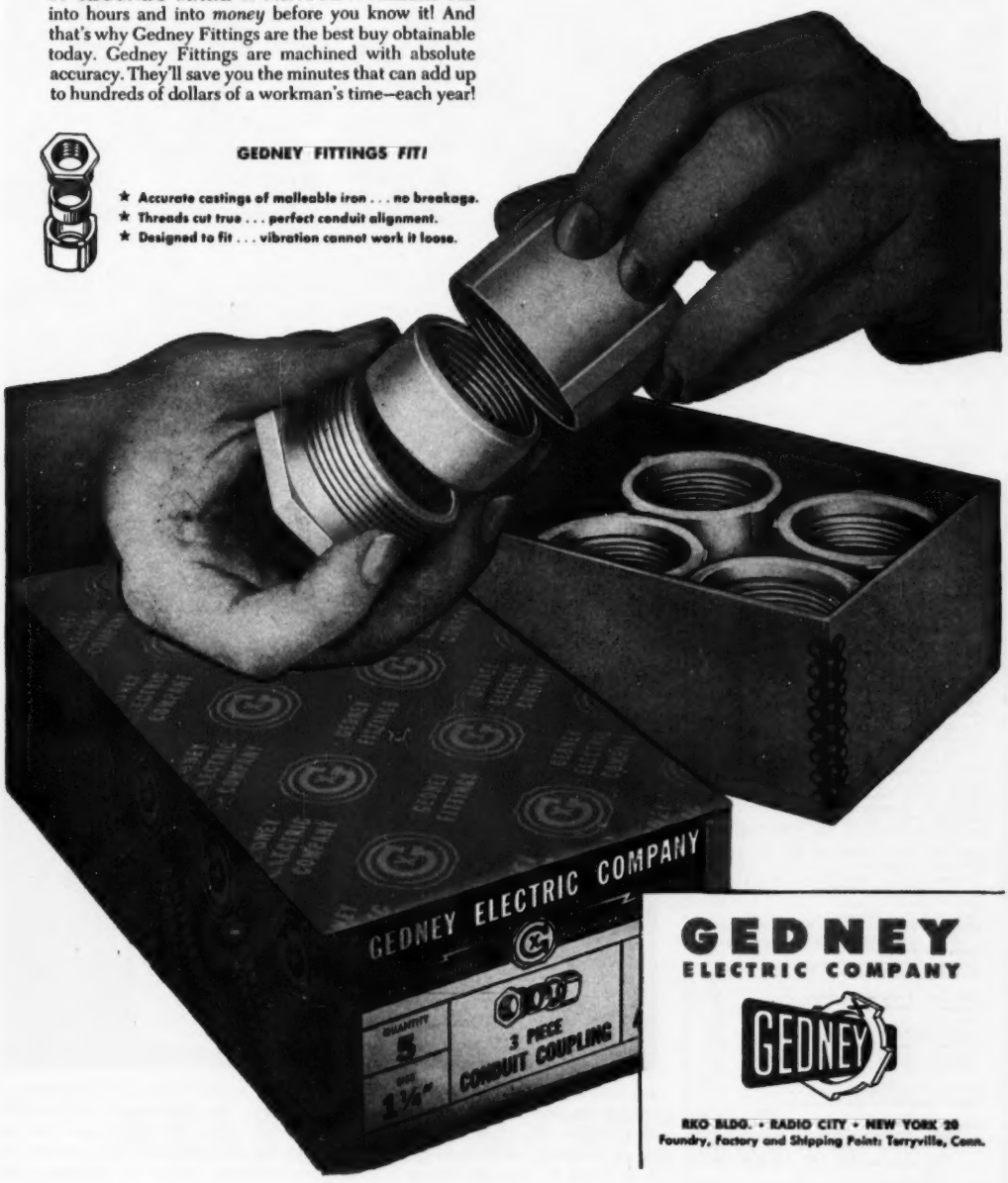
Lines and personnel have been added by the Earl S. Condon Co., West Coast manufacturer's representative for 30 years. Shown left to right: first row seated, Kim Koundouriotis, Charles Morris, Earl S. Condon, Ash Davis, Ted Ford; second row, Rosemarie Seeger, Roger Stewart, Ed Maupin, Clarence E. Brooks, David J. Fisher, Connie Destito; third row, Michael Rohrich, R. S. Van Wie, Martin MacDonald, Edward E. Bielicki. Among the organizations Condon represents are: Burndy Engineering, Lapp Insulator, Preformed Line Products, United States Rubber and Cole Electric companies

The 60-second gold mine!

60 SECONDS MAKE A MINUTE . . . minutes run into hours and into *money* before you know it! And that's why Gedney Fittings are the best buy obtainable today. Gedney Fittings are machined with absolute accuracy. They'll save you the minutes that can add up to hundreds of dollars of a workman's time—each year!

GEDNEY FITTINGS *FIT!*

- ★ Accurate castings of malleable iron . . . no breakage.
- ★ Threads cut true . . . perfect conduit alignment.
- ★ Designed to fit . . . vibration cannot work it loose.



GEDNEY
ELECTRIC COMPANY

GEDNEY

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PROFILES

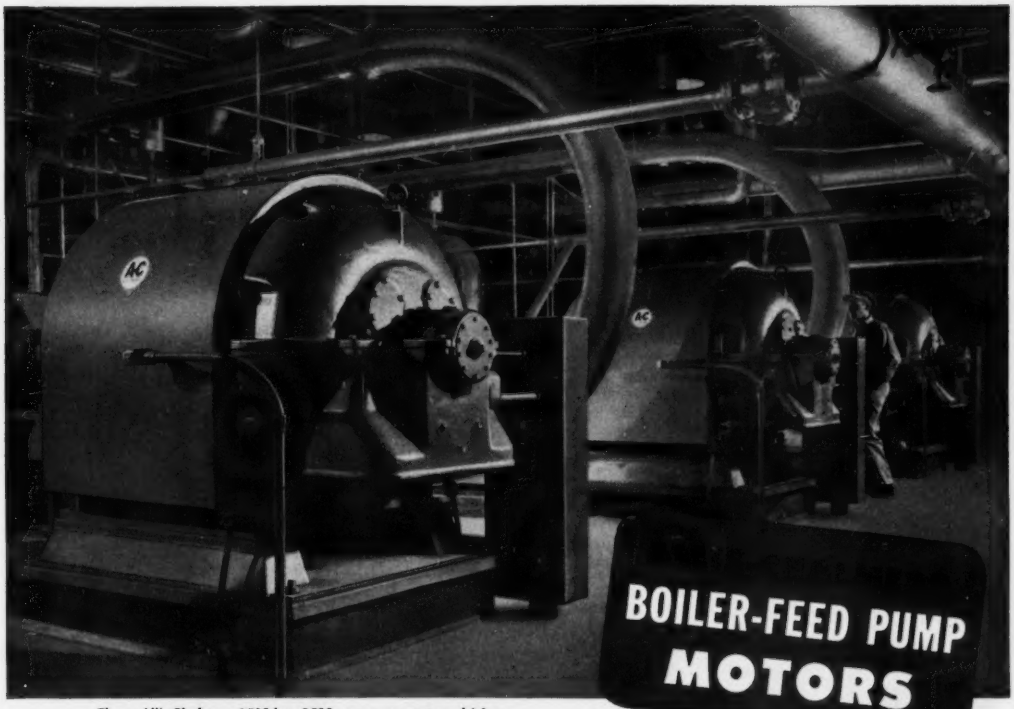
McGregor

Reilly

Douglas B. McGregor was named vice-president in charge of property evaluation for Arizona Public Service Co. when it was formed by merger of Arizona Edison and Central Arizona Light & Power companies. He also will be assistant to J. T. Kimball, vice-president in charge of sales and personnel. William P. Reilly was made vice-president in charge of the new company's state division, comprising all communities outside the central part of Arizona. F. T. Fahlen Jr. took on the duties of vice-president in charge of the valley division, which includes the central Arizona area. McGregor was with Edison, Reilly, the Northern Arizona L&P, and Fahlen, Central Arizona Light & Power

Fahlen

You can tell its Hawaii by the orchid leis, and it is—the newly elected officers of Hawaii Chapter, IAEInspectors. Seated—H. C. Peters, vice-chairman; E. B. Hamilton, chairman; E. W. Small, secretary-treasurer. Standing—John T. Carey, chairman, advisory committee; H. K. Swanholm, assistant secretary; S. F. Bovino; E. L. Ralston Jr.; H. P. Field; K. Iwamoto—members of advisory committee. Arthur Y. Akinaska spoke



Three Allis-Chalmers 1500-hp, 3580-rpm cage motors driving pumps in Alabama Power Company's Gorgas Steam Plant.

Give Extra Protection TWO WAYS!

BECAUSE LOSS OF FEEDWATER can lead to extensive boiler damage, it is common practice to provide protection by means of a standby boiler-feed pump unit. It is equally good practice to insist on the additional protection of the operation-proved reliability of Allis-Chalmers motors.

YOU GET THESE FEATURES

As the result of a quarter century of development, A-C two-pole cage motors offer you these features:

- Ring-oiling adequate for prolonged emergency operation without forced-feed oiling.
- Equalizing air pressure chambers to positively keep oil out of motor windings.
- Air distribution arrangement that eliminates hot spots in both stator and rotor.
- Forged end rings, drilled for cage bars.
- *Dew-drop* bars that give better performance and stay tight in rotor core.
- Oxygen-free copper or deoxidized copper-base alloy bars and end rings to eliminate embrittlement from silver-brazing.
- Separate steel balancing rings for dynamic balancing without weakening end rings.

BULLETIN TELLS THE INSIDE STORY

For more details about these large two-pole cage motors, ask your nearby A-C representative for Bulletin 05B7550, or write to Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3719

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Cole Electric Co.

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AIR BREAK DISCONNECTING SWITCH
34,500 volts—600 amperes—Type O-2
Vertical break. Three pole. Single throw. Group operated.
One pole shown.
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"We got production results from our new plant's lighting design!"

—writes Paul C. Newell, Publisher of the Shafter Press

A newspaper plant design calls for efficient lighting to get the most out of efficient space planning, reports Paul Newell, Publisher of the *Shafter Press*. "In our new building," he writes, "we used glareless fluorescent lighting where it was needed most. Wall colors were chosen to make the best possible use of light. In the shop we have 73 foot-candles on our stones and working surfaces. And the results have paid off in greater production and employee comfort!" Why not survey *your* plant for better lighting now? Call the lighting engineer at your P. G. and E. office, or consult your contractor.

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P.C.E.A. is a "do something" organization—check its long list of accomplishments as evidence. But the list is not finished. There's still much to be done, and we urge your active participation in the program.

Write for your free copy of the booklet, "Your P.C.E.A. and How It Operates," That's a good way to get started, and now is a good time.

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